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Full Name of Author — Nom complet de l'auteur

Emma Wyoma Pirato

Date of Birth — Date de naissance

October 22, 1943

Country of Birth — Lieu de naissance

Canada

Permanent Address — Résidence fixe

11731 83 Avenue, Edmonton, Alberta

Title of Thesis — Titre de la thèse

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Name of Supervisor — Nom du directeur de thèse

Dr. W.H.O. Schmidt

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THE UNIVERSITY OF ALBERTA

AN ANALYSIS OF THE CONCEPTUAL BASIS OF MODERN CREATIVITY THEORY

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled AN ANALYSIS OF THE CONCEPTUAL BASIS OF MODERN CREATIVITY THEORY submitted by Emma Pivato in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

W H Kilpatrick

Supervisor

Peter Munz

S. Hunka

J. H. Van De Pette

Date June 24, 1980

Philip E Vernon

External Examiner

To
Joe
my husband
and to
Janni
Juliana
and
Alexis
for their
help
encouragement
and
patience

ABSTRACT

Creativity research increased dramatically after Guilford's (1950) address to the American Psychological Association. However, since 1975 it has diminished , even though there has been no apparent resolution of the issue. It would seem that psychologists are beginning to give up on the possibility of fully explaining human creativity. Why?

The present study is an effort to find out why. It proceeds analytically by tracing the creativity concept back to its origins and forward through its various expressions in the literature. It threads its way through the maze of assumptions and definitions which have led to the present impasse in creativity research, looking always for the reasons why this should be so.

The historical issues and research topics considered in depth in this thesis are associationism, German idealism, and the theories of Guilford, Cattell and MacKinnon. Other major themes in the literature are considered more generally.

In the conclusion an alternative conceptual basis for creativity is suggested which may allow for the circumvention of many of the dead ends psychologists have reached in the past. It is our hope that future researchers will examine this possibility.

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Finally, I must mention the early inspiration of George Price whose approach to history and scholarship provided the model for this thesis.

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INTRODUCTION

Creativity, what is it? How, the psychologist asks, can he recognize it, understand it, explain it? How, the applied psychologist asks, can he use the knowledge so gained to encourage creativity in the schools, in industry, in human affairs generally? This thesis is about creativity but it does not ask either of these questions. Instead, it asks why? Why, after twenty-five years of exhaustive research, have no satisfactory answers been found?

Why questions cannot be resolved through the use of the same techniques which are employed for handling what and how questions. In all our What is it? questions there are presuppositions which orient us and constrain us in our search (and, more technically speaking, research) for the answers. These presuppositions are of two kinds: ontological or epistemological. Either they relate to our conceptions of the nature of human beings (the nature of man-in-his-world) or they relate to the possibilities of human knowing.

Specific methodologies in a particular discipline, such as in psychology, are always embedded in these ontological and epistemological presuppositions. Sometimes they are clearly articulated but, more usually, they are taken for granted. As long as the findings resulting from the application of a particular research methodology appear to 'make sense', or at least sufficient sense to justify the hope that

further research based on the same model will uncover even more meaningful insights, little need is felt to critically examine its ontological and epistemological underpinnings, and little recognition is given to the fact that these necessarily slant the research in a particular direction.

The modern, psychologically oriented body of creativity literature under consideration in this thesis (1950-1975) appears to have developed rapidly in the late 50's and the 60's, to have 'peaked' in 1972, dropping off radically in 1974 and 1975 and then rising again but not to its former levels. Recent trends indicate another but less radical drop and it seems safe to say that the early, enthusiastic phase of the creativity movement is over. [1]

It is over but no real answers have been found. Why? Was the quest for sensible, meaningful insights into the nature of creativity foredoomed to failure by inappropriate suppositions about man-in-his-world and about ways of knowing? Or were the answers expected too soon and must we now retrace our paths with that dogged perseverance which may eventually uncover the as-yet-unknowns?

What we hope to do in this thesis is to provide some plausible answers for these questions. How we hope to do it is as follows. First, we must examine the literature to determine the main presuppositions which have directed and confined the search for an answer to the question, What is creativity? This has proven to be a somewhat difficult undertaking because Psychological Abstracts between 1927 and 1975 cites more than 3500 different articles on creativity. However, we have reduced this undertaking to manageable proportions by choosing to focus on the theoretical contributions to the literature.

A review of the literature completed in 1976 as an initial phase of this project [2] revealed that more than 60 different approaches to the creativity problem have been taken by modern, and mainly North American, psychologists. However, when these diverse lines of thought are closely examined, it becomes evident that they are not as independent of each other as would first appear to be the case. Together they form a complex network which attacks the problem of creativity from many different angles. However, their starting points are, for the most part, reducible to three, paralleling the tripartite split in North American psychology in general: mainstream, psychoanalytic and humanistic.

We have found that most of the creativity literature is concerned with practice rather than theory, either with refinements of methodology within an existing theoretical framework or with the practical applications of it beyond Academia. By sorting out theory from practice initially, in ways which will be discussed at a later point in the thesis, our task of picking out presuppositions has been much simplified but other problems remained to be overcome.

Some of the presuppositions upon which modern creativity theory and modern psychology are grounded can be traced back to Aristotle if not before. How does one survey a research front that spans more than 2000 years? We began by reading some of the work of the 'most talked about' creativity theorists [3]: John Guilford, E. Paul Torrance, Sarnus Mednick, Frank Barron, Raymond B. Cattell, Donald MacKinnon, Ernst Kris, Lawrence Kubie and Abraham Maslow. In our reading we discovered, not surprisingly, that their major presuppositions parallel those of

psychologists in general, nativism or empiricism being the most basic of these.

The fundamental question that learning theorists, developmental psychologists and creativity researchers all ask is: How does the child come to know his world? Is the world imposed on him through experience or does he know it through some inborn structure of mind? In Chapter II we examine associationism, which is an example of the former, and in Chapter III we examine German idealism, which is an example of the latter. These two theories appear to have had a considerable influence upon the directions of modern creativity research.

After tracing the philosophical grounds of modern creativity theory in Part I, we turn in Part II to an in-depth examination of three major, mainstream creativity models which have been developed by Guilford, Cattell and MacKinnon. These researches have been chosen because we believe that, both conceptually and methodologically, they are representative of the creativity literature at its best. Here we will also be looking for assumptions which may have weakened or distorted these theories. However, these assumptions will be of a more specific nature than those which are examined in Part I.

Finally, in Part III, we will examine the literature, both mainstream and nonmainstream, pre-Guilford and post-Guilford, noting similarities and differences in the various positions and unspoken assumptions which may have biased the respective researches in one direction or another.

In our concluding chapters we will discuss positivism as an "ultimate framework" (Polanyi, 1962) underlying all the major and minor assumptions which have been considered. It is our opinion that it may be the "ultimate" stumbling-block to a viable theory of creativity.

Notes - Introduction

1. Graph of number of creativity articles cited in Psychological Abstracts from 1950 to 1979.

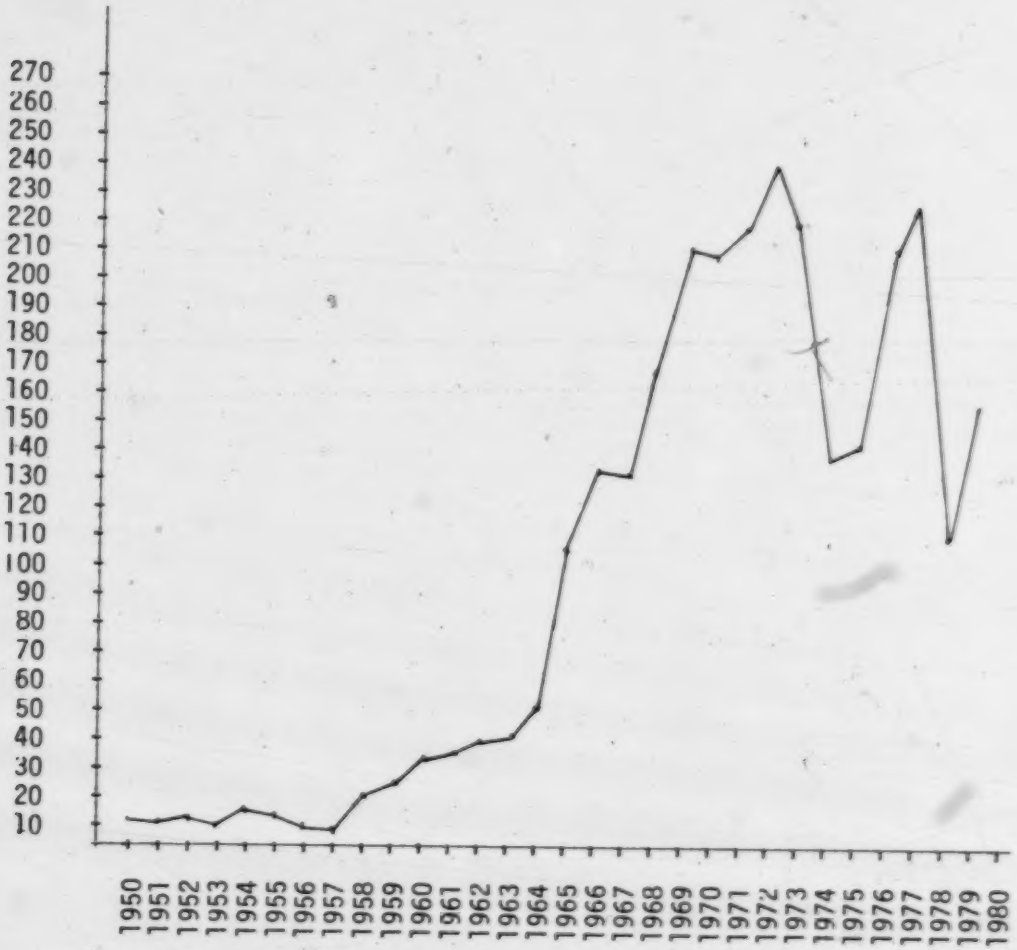


Table 1

The figures for 1978 and 1979 are projected on the basis of the volumes of Psychological Abstracts for those years available at the time of writing. Insufficient evidence is available to warrant a projection for 1980. The proportion of creativity articles in relation to the ever growing number of articles published in psychology each year has not been indicated. If this factor were taken into account the drop in the literature would undoubtedly be much more striking.

2 See Appendix A for an outline of these 60 approaches.

3 In hindsight, we recognize that our criteria for this were:
(a) frequent references to creativity theorists by staff and and graduate students on campus
(b) frequent references to them in the indices of Psychological Abstracts
(c) commentator evaluations.

4 Guilford's famous article, Creativity (1950), which is credited with stimulating the subsequent interest in creativity research by psychologists, will be used as a dividing point in our discussion of the literature. Pre-Guilford will refer to all the creativity research that preceded its publication and post-Guilford will refer to all that has followed it.

PART I

An examination of the historical and philosophical grounds of modern creativity theory

> It cannot be too strongly emphasized that the psychologist needs to have a good background in the history of philosophy and science, out of which psychology has emerged. Otherwise, he is incapable of evaluating 'new' ideas which may, in fact, not be new at all; but, beyond such errors, which even a knowledge of history cannot totally prevent, his outlook without this background must be limited to fads of the day, with all that signifies in paucity of ideas (p. 9).
>
> (Vinacke, 1952)

CHAPTER I

An Analysis of the Origins of the Term: Creativity

Etymology

The greatest impediment to tracing early contributions to the creativity literature is the term, creativity, itself. This is a very recent term which appears to have been coined by American psychologists as a first step towards operationalizing the elusive phenomenon of creative thinking. Creativity connotes a distinct and measurable state of being while creative thinking refers to a process, and a very intangible one at that. Scientists in general have developed better tools for analyzing states than processes so this particular attempt to render the dynamic static might be viewed as an appropriate approach to the problem of creativity, as long as too much is not lost in the translation. At this point we cannot say if that is the case but we can examine the historical swing from act to state by consulting some major dictionary and encyclopedia references to the subject.

We will look first at reference works for psychologists by psychologists. These contain the terms that are in common usage by the psychological fraternity. The term, creativity, is absent from older psychological reference works such as Harriman's Encyclopedia of Psychology (1946), where instead we find reference to creative

thinking . In the International Encyclopedia of the Social Sciences (1968) Donald MacKinnon, research psychologist at the Institute of Personality Assessment and Research at Berkeley, has contributed a section in which all discussion of the creative process is subsumed under the general heading of creativity. Eysenck's Encyclopedia of Psychology (1972) includes the term, creativity, and defines it. The definition is in terms of thinking but the emphasis has now shifted to an ability to think: "The ability to see new relationships, to produce unusual ideas and to deviate from traditional patterns of thinking."

We turn next to authoritative general dictionaries and encyclopedias. The purpose of the Oxford Dictionary is to record common English usage. It avoids terms which are still perceived to be within the exclusive domain of a particular discipline and also most idioms which seem to remain exclusive to American English. The term, creativity, does not appear in the Oxford Unabridged Dictionary of 1933, reprinted in 1961, nor even in the Shorter Oxford Dictionary whose etymologies were revised in 1973 and 1974. However, this term does appear, for the first time, in the 1972 edition of Encyclopedia Britannica. Notably, the article under this heading was contributed by Frank Barron, an American psychologist whose creativity research has been closely associated with that of Donald MacKinnon. What is interesting about the treatment of creativity in the Encyclopedia Britannica (1972) is that the term is introduced with an explanatory statement that embeds the very recent notion of creativity in a tradition of thought and a wider context that is missing in the narrow

definitions, such as that of Eysenck, usually found in the specialized literature of psychologists.

> The question concerning the nature of psychic creation is a special aspect of the question of how new forms come into existence in all of nature.

While the American term, creativity, is now well established throughout the English-speaking world, it is not yet used universally, as Stanley Krippner, an American psychologist, has pointed out (1973).[1]

> The French have no equivalent to the English word 'creativity'. They still employ the word 'creation' suggestive of a spiritual link with original creation. Our term 'creativity' (a quite recent one, incidentally) permits us to consider as creative many products and persons which are only remotely linked with any idea of original creation (p. 123).

Créativité does exist in French but only in a clearly imported sense. It is present in Nouveau Petit Larousse (1968), where it is defined simply as "Caractère d'une personne créative", and in Piéron's Vocabulaire de la Psychologie (1968) its American origins are clearly indicated.

> créativité
> Fonction inventive, d'imagination créatrice, dissociée de l'intelligence, que J. W. Getzels et Ph. W. Jackson (1962) ont cherché à explorer avec divers tests spéciaux. . . .

That the term, créativité, is an imported one becomes clear in Bourgeois' article on Création in Encyclopaedia Universalis (1969). The third part of this article is sub-headed Création et créativité but throughout this several page long section, which has the sub sub-headings 1. Phénoménologie de la création humaine and 2. Philosophie de la création humaine, the term, créativité, is never used again. The terms, l'intuition créatrice and la création humaine, are

used instead. The general tone of this article is in the nature of Hegelian dialectic, the following statement being a case in point.

> L'intuition créatrice intègre l'intelligence fabricatrice et l'instinct générateur dans l'unité vivante de l'imagination, dont la perfection est le génie.

We believe it to be a further indication that terminological differences in French and Anglo-American references reflect a deeper difference in meaning of the creativity concept.

The Religious Roots of Creativity

Krippner (1973) has implied that the introduction of the new term, creativity,[2] has allowed tne English-speaking world to escape the spiritual connotation that creation holds. After a close examination of the literature, however, we have concluded that this is not the case. While direct identification of creativity and creation may not take place in English there is considerable evidence to indicate that our understanding of human creativity has been modelled on our conception of divine creation. This can be quite clearly seen in at least two areas, creation ex nihilo and the widespread emphasis on the novel product criterion of creativity. The result is a concealed element of supernaturalism in much of our theorizing about creativity. We will consider these issues in their historical context to indicate why they have remained so firmly embedded in our thinking on the subject of human creativity.

Although contemporary Britain and North America appear to be largely secularized, the pervasive Judeo-Christian doctrine of creation ex nihilo has profoundly affected modern creativity theory. In the

first chapter of Genesis in the Bible, verses one and 31, we read that

> In the beginning God created the heaven and the earth.
>
> . . . .
>
> And God saw every thing that he had made and behold, it was very good.
>
> . . . .

This understanding of the origin of the universe is retained in the New Testament, as well. The gospel of Saint John begins

> In the beginning was the Word, and the Word was with God, and the Word was God.
> The same was in the beginning with God.
> All things were made by him; and without him was not any thing made that was made. .3

Hebrews 11, verse three, states that

> Through faith we understand that the worlds were framed by the word of God, so that things which are seen were not made of things which do appear.

While the concept of creation ex nihilo is reinforced in the New Testament, a careful reading of Genesis 1 suggests that the popular understanding of this term, i.e.'In the beginning there was nothing and God created heaven and earth', is incorrect. The second verse of Genesis 1 suggests the existence of a prior substance and is in fact very reminiscent of Thales who considered the 'primitive stuff' to be water.

> The earth was formless and desolate.
> The raging ocean that covered everything was engulfed in total darkness, and the power of God was moving over the water.

The difference between Thales' account of the beginning of the world and the account given in Genesis, however, is that the former attempted to give a scientific explanation by describing a natural process of differentiation of the world from the primitive stuff of the universe while Genesis is an unabashedly supernatural account of the same event.

What does creation ex nihilo really mean, then, and how has it affected modern thinking on the subject of human creativity? As we might expect, it is a concept which has been discussed at great length by biblical scholars and the following account should clarify the issue sufficiently for our purposes. It is from Davidson, Stibbs and Kevan (1961).

> There are two words used in the Hebrew text to indicate the divine activity in the making of the world: bara, commonly rendered 'create', and asah, usually translated 'make'.
>
> . . . .
>
> Bara is found in verses 1, 21, and 27; that is to say, at the beginning of all existence; at the beginning of all animate existence; and at the beginning of all spiritual existence, so far as this world is concerned.
>
> . . . .
>
> In verse 1 the idea of creation excludes the idea of any previously existing material, and this is the sense in which the word is explained as a making of the universe 'out of nothing'; but in verses 21 and 27 the idea of creation plainly does not exclude the use of such pre-existing material. The chief thought to bear in mind, therefore, with regard to the meaning of the word bara, is not that of the exclusion of existing material from the act, but the achievement of something completely new, and without any causal relation to preceding agencies (pp. 76-78).

What emerges as unique in the biblical story of creation as it is analyzed here is not creation ex nihilo per se, the creation of the world out of nothing. Rather, it is the bringing into being of something entirely new, so new that no 'laws of association' could possibly explain its relationship to anything that had gone before. Novelty, in this radical genuine sense, is necessarily supernatural.

That human creativity was modelled upon spiritual creation becomes immediately obvious when we reflect upon its two chief characteristics as popularly understood: novelty and the production

of something from nothing. It can be argued that the thrust of modern psychological research into the phenomenon of human creativity has been to provide a naturalistic explanation of this process which would make it fully independent of its spiritual analogue, but it cannot be argued that this goal has been achieved. Some still maintain that it is a goal which can never be reached, by definition.[4]

In an early article, Morgan (1953) anticipated the difficulty modern psychologists would have in coming to terms with the problem of reconciling novelty and naturalism in creativity theory.

> How, in general, can we account for the occurrence of any totally new complex? Is the artwork to be thought of as totally new? It is said to be 'unique'. Yet it is somehow related to the familiar. Something new has been made out of some things old. More specifically, how can a future event--the to-be-created painting or poem--condition the present event of creating it. Must we, for instance, posit some ontologically telic factors to account for creativity (p. 5)?

He goes on to say that associationism cannot explain creativity because

> . . . it limits itself to a denial that there is any such thing. To prove that works of art are merely reshufflings of old experiences will require (more) explicit statements of the laws (of associationism than presently exist). . . .

Because of the popularity of the associationist model, Morgan's dilemma has been largely overlooked by psychologists. We suggest that a major reason for this is the psychologist's natural preference for analyzing scientific rather than artistic creativity since he is by training more familiar with examples of the former than the latter.[5] It is much more plausible to view scientific creativity as a "reshuffling of old experience" or a particular form of problem-solving than it is to view artistic creativity in these ways.

Also, science is frequently a question of teamwork while art is very individual. Furthermore, because of the high value Western societies place on technology, the distinction between pure and applied science is frequently blurred and what is merely innovative is often considered creative (Ghiselin, 1963; Kohl, 1965). By contrast, hack writers and commercial artists are never considered creative, even when in certain instances they deserve to be.

One way to sum up the differences between creative scientists and artists is to say that the former need only to answer a question (problem) creatively while the latter must both ask and answer the question creatively (Getzels and Csikszentmihalyi, 1975). However, such major differences between artists and scientists are usually minimized by Western psychologists in keeping with their ready acceptance of the generic term, creativity. All forms of creative expression are assumed to be specific instances of the same general mental exercise expressed through different modalities.

This points up one of the major assumptions underlying, and distorting, modern creativity research, i.e. that all forms of endeavor now termed creative involve basically similar mental processes. It is this assumption which has made it possible for the supernaturalism entailed by the novelty criterion of creativity to be overlooked since it has allowed for the extension, consciously or unconsciously, of the associationist model from restricted forms of scientific creativity to all creativity. As this model has exercised a very much greater influence on modern creativity theory than is generally realized it will now be considered in some detail.

Chapter I - Notes

[1]For a further discussion of this point see Dufresne-Tasse, C. Insight, the troublemaker; The French writers of the 20th century before creativity. Journal of Creative Behavior, 1975, 9, 2, 137-146. She reports that, although the Bibliotheque Nationale de Paris has, by law, copies of all works published in France, its card-index does not include the word, créativité, as a heading.

[2] Creativity is an English term which has been translated into French as créativité but creation and création are both derived from the Latin, creationem. Surprisingly, this term has no counterpart in other ancient languages. However, its root, creatus (to create) originated from the Greek, kranein (to accomplish) and the Sanskrit, kar (to make). This is based on Webster's New Twentieth Century Dictionary of the English Language, Unabridged. Russell, T. H., Bean, A. C. & Vaughan, L.B. (Eds.) New York: Publishers Guild, 1942, pp. 404-405. His first definition of creation is "The act of creating from nothing; the act of causing to exist; and especially the act of bringing this world into existence".

We suggest that the term, creation, which carries the connotation of creation ex nihilo in the Judeo-Christian tradition, was not necessary in other ancient cultures because they did not have cosmologies based on the assumption of the supernatural production of something from nothing. The early Greeks provide a good example of this. Thales maintained that the earth came from water; Anaximander speculated that it was a bubble in a "boundless mass"; and Anaximenes believed that it had developed from the air. The well-known Greek historian, John Burnet (1920) suggests that all of these theories are based on the still more ancient Greek concept of opposites and that these in turn were based on a prior theory of a "separating out" from the common mass. The ancient Greek gods were very anthropomorphic, many of them being "mere personifications of natural phenomena, or even of human passions (p. 29)".

> . . . it was just this non-religious use of the word 'god' which made it possible for the Milesians to apply it to their primary substance and their 'innummerable worlds'. That way of speaking does not bear witness to any theological origin of Greek science, but rather to its complete independence of religious tradition. No one who has once realized the utterly secular character of Ionian civilization will ever be tempted to look for the origins of Greek philosophy in primitive cosmogonies (p. 29).

[3] All quotations from the bible are taken from the Good News Bible: Today's English Version. London: The Bible Societies, Collins/ Fontana, 1976.

[4] See Hausman's A discourse on novelty and creation (1975) for a discussion of the dilemma novelty poses for positivism in terms of

method, i.e. that the existence of novel items would not allow for categorizing. He points out that

> . . . positive knowledge must look for repeated and repeatable patterns in observations. Its methods call for treating the world in terms of kinds and classes of previously observable events (p. 345).

[5] Frank Barron is an obvious exception to this since most of his creativity research is based on an analysis of creative writers. However, he became a psychologist quite by accident, he reports, after having done his undergraduate work in literature.

CHAPTER II

Associationism:

Its Place in Psychology and Creativity Theory

From our research in this area we have concluded that there is a definite tendency to circularity in definitions of associationism or association of ideas, whether they are general, psychological or philosophical. The following examples all indicate this.

> Associationism. The name given to a psychological theory, which takes association to be the fundamental principle of mental life in terms of which even the higher thought processes are explained.(Drever, 1974, p. 20).

> associationism: the psychological doctrine that mind is made up of simple elements in the form of ideas which come from sensory experience. These ideas are held together and are related by associations (Chaplin, 1975, p. 40).

> association. . . . of ideas, mental connexion between an object and ideas related to it. . . (Concise Oxford, 1944, p. 65).

> Eighteenth-century British psychology. Locke's new way of ideas laid the foundation for the twin doctrines of sensationism and associationism. The theory was that the mind is composed only of sensations and mental images (mental images being faint copies of sensations), that all complex percepts or ideas are formed through association and that all trains of thought arise through association (Edwards, 1972, p. 15).

It can be readily noted in these definitions that they are consistently defined in terms of themselves either directly, i.e. "association", or indirectly through the use of synonyms, i.e. "connexion" and "relation". What are the implications of this circularity?

The descriptive nature of these definitions indicates that the terms, associationism and association of ideas, were originally coined to account for the common sense observation that a given object or idea calls to mind other objects or ideas which have one or more elements in common with it. Now if associationism were only a formulation of this commonplace observation it could not be considered a theory, properly speaking, for the term, theory, means

> theory, n. Supposition explaining something, esp. one based on principles independent of the phenomena etc. to be explained, opp. to hypothesis. . . .(Concise Oxford, 1944, p. 1272).

The definitions previously given are descriptive, not explanatory, and therefore they cannot be said to refer to a theory.

Associationism can be considered as an hypothesis, however, if it is taken to entail that all ideas in the mind can be accounted for through the relationship of sensations.

> hypothesis, . . . Supposition made as basis for reasoning, without reference to its truth, or as starting-point for investigation, . . . (Concise Oxford, 1944, p. 560).

It can be seen that all the definitions of associationism which have been given express this position unequivocally, with the exception of a slight looseness in Drever's formulation. However, an examination of various histories of associationism suggests that such consistency is not universal.[1] The loose use and the misuse[2] of this term poses a serious problem for anyone trying to trace the lines of influence from it to modern theories of cognition and creativity.

Has associationism ever functioned as a theory in the proper sense of the term? To answer this question it would be convenient to turn to a ready model of associationism and check out its suppositions.

Since no appropriate model exists, however, [3] it is necessary to review the early history of associationism. Our expectation is that by clearly determining its scientific status we will be better able to assess the real extent of its influence on modern psychological theories.

One might well ask Why bother? If association is as conceptually confused an issue as it appears to be, then what possible explanatory value could it have for modern theories of thinking and creativity? But, though hindsight may reveal its confusions and render its theoretical status questionable, it has been accepted throughout the history of psychology as its most important general position about the sources of behavior. For that reason if for no other we cannot afford to ignore it.

Warren (1921) points out that all S-R theories are forms of associationism and he says that, historically, associationism has seemed best able to account for the process by which simple sense data are built up into complex mental constructs (p. 4). Drever (1968) says

> Associationism has been our only really general theory since we began to think about human behavior. It may be that in this complicated field we have stumbled upon the right answer at our first attempt. . . (p. 27).

Koestler (1964) expresses it somewhat differently, saying "Associationism is dead, but association remains one of the fundamental facts of mental life (p. 642)." We conclude that there must be some definite but little known reasons as to why associationism has exercised such an apparently profound influence on the development of psychology. Since it may also have strongly influenced the formulation of basic assumptions in creativity theory we turn now to a selective, although fairly extensive, historical examination of it.

The Early Stages of Associationism

Plato (428-348 B.C.). Historians describing early associationism generally begin with Aristotle but for us it is necessary to begin with Plato. His brief and casual references to associationist principles suggest that he anticipated Aristotle on this matter but they also suggest that he may not have been saying anything original on the concept of association of ideas. These observations could well have been part of the thinking of his times. As Brett (1962) says

> Plato does not review, as does Aristotle, the psychological work of earlier thinkers. It is, however, obvious from such references as he gives and from the nature of his work, as a whole, that he is strongly influenced by previous theories (p. 83).

Plato was an Idealist who considered knowledge gained through the senses to be inferior to knowledge gained through rational cognition. Only the latter could lead to a true awareness of the perfect Forms or Ideas, already present in the immortal soul. Plato believed that these innate truths could not easily be recalled because of interference from the body. In his theory of Reminiscence he argues that the process of recollection can be aided by the gently probing questions of a skilled teacher (Socratic mid-wife) but he also says that this process can sometimes be facilitated by sense perception, as in the association of ideas.

Association of ideas is most clearly referred to by Plato in the Phaedo in the following passage (Hamilton and Huntington, 1964).

> Are we also agreed in calling it recollection when knowledge comes in a particular way? I will explain what I mean. Suppose that a person on seeing or hearing or otherwise noticing one thing not only becomes conscious of that thing but also thinks of a something else which is an object of a different sort of knowledge. Are we not

d justified in saying that he was reminded of the object he thought of?

What do you mean?

Let me give you an example. A human being and a musical instrument, I suppose you will agree, are different objects of knowledge.

Yes, certainly.

Well, you know what happens to lovers when they see a musical instrument or a piece of clothing or any other private property of the person whom they love. When they recognize the thing, their minds conjure up a picture of its owner. That is recollection. In the same way the * sight of Simmias often reminds one of Cebes, and of course there are thousands of other examples.

Yes, of course there are, says Simmias.

e So by recollection we mean the sort of experience which I have just described, especially when it happens with reference to things which we had not seen for such a long time that we had forgotten them.

Quite so.

Well, then, is it possible for a person who sees a picture of a horse or a musical instrument to be reminded of a person, or for someone who sees a picture of Simmias * to be reminded of Cebes?

Perfectly.

And is it possible for someone who sees a portrait of Simmias to be reminded of Simmias himself?

74 Yes, it is.

Does it not follow from all this that recollection may be caused either by similar or by dissimilar objects? *

Yes, it does.

When you are reminded by similarity, surely you must also be conscious whether the similarity is perfect or only partial.

Yes, you must (pp. 56-57).

As indicated by the asterisks, Plato anticipates two of Aristotle's principles of association: contiguity and similarity or contrast. He was in no sense an associationist, however, a position incompatible with Platonic nativism. He merely used these examples of the association of ideas as a form of validation for his doctrine of the existence of an immortal soul. Plato took the capacity to make connections between sensations on the basis of material stored in memory of which one is not conscious as an indication of a previous existence.

Aristotle (384-322 B.C.). A popular 20th century view of Aristotle holds that, while he started as an enthusiastic Platonist, he eventually evolved into a pure empiricist. More recent thinking, however, suggests that he retained to the end of his life certain Platonic metaphysical doctrines which are of interest to us here. He never gave up his notion of a soul and he believed, like Plato, in the doctrine of recollection of knowledge acquired by the soul before birth. It is embedded in this context that we find his famed remarks on the association of ideas.

451[b]

Acts of recollection, as they occur in experience, are due to the fact that one movement has by nature another that succeeds it in regular order.

If this order be necessary, whenever a subject experiences * the former of two movements thus connected, it will (invariably) experience the latter; if, however, the order be not necessary, but customary, only in the majority of * cases will the subject experience the latter of the two movements. But it is a fact that there are some movements, by a single experience of which persons take the impress of custom more deeply than they do by experiencing others many times; hence upon seeing some things but once we remember them better than others which we may have seen frequently.

Whenever, therefore, we are recollecting, we are experiencing certain of the antecedent movements until finally we experience the one after which customarily comes that which we seek. This explains why we hunt up the series (of movements), having started in thought either from a present intuition or some other, and from something either similar, or contrary, to what we seek, or else from that * which is contiguous with it. Such is the empirical ground of the process of recollection; for the mneumonic movements involved in these starting-points are in some cases identical, in others, again, simultaneous, with those of the idea we seek, while in others they comprise a portion of them, so that the remnant which one experienced after that portion (and which still requires to be excited in memory) is comparatively small (McKeon, 1966, pp. 612-613).

The asterisks indicate, in descending order, Aristotle's three laws of association: causality, contiguity, and similarity or contrast,

respectively. In this passage Aristotle suggests little that was not already suggested by Plato with regard to the possible kinds of association. Where he does differ significantly is in his attempt to explain the principles of association which Plato merely describes. It is for this reason that he is considered the father of associationism as a psychological theory of behavior.

John Locke (1632-1714). The modern history of associationism is generally taken to begin with the writings of the British empiricist, John Locke. He was the one who introduced the terms, association of ideas (Runes, 1967) and laws of association (Drever, 1968), although some commentators suggest that he did not do much more than this. There is no evidence that he was acquainted with Aristotle's remarks on association of ideas nor even with those of his countryman and near contemporary, Thomas Hobbes.[4]

Locke's views on the association of ideas were initially, and most completely, presented in his major epistemological work, An essay concerning human understanding. Although he revised this work several times and made occasional comments on the association of ideas elsewhere in his works,[5] his views on this subject never changed substantially after their first presentation. Basically he held that association of ideas, in his sense of the term, was the source of much false knowledge and confusion and should therefore be avoided or eradicated wherever possible.[6]

Locke's epistemology, for which he is chiefly remembered, might be said to be tangential to his major interests which, at least initially, were politics, theology and ethics. He wanted to increase his knowledge

in these fields but did not think the current method of beginning with dogmatic assertions and making deductions on the basis of them could lead to true knowldge, at least in these particular subject areas. He speculated that the method then in general use in the natural sciences, i.e. objective observations followed by cautious generalizations, might be fruitfully applied to philosophical questions. The Essay was his great experiment in this procedure.

Although still a rationalist in part,[7] Locke did not accept the existence of innate ideas, holding that all ideas originate from sensations which are passively absorbed and stored as simple ideas. He argued that complex ideas arise through the activity[8] of the mind in relating these simple ideas in various ways. Between the two, simple and complex, Locke believed that all our ideas can be accounted for by experience. His basic thesis can be summarized as follows: The mind has no ideational content at birth but does have various capacities: to passively absorb sensations, to store them as simple ideas, to actively reflect upon them and, in so doing, to turn them into complex ideas by repeating, comparing and uniting them.

Locke used the actual term, association of ideas, however, to refer to the connection in our minds of ideas which have "no natural cohesion" (Lamprecht, 1956, p. 332). He viewed it as a major source of error and confusion.

> This wrong connexion in our minds of ideas in themselves loose and independent of one another, has such an influence, and is of so great force to set us awry in our actions, as well moral as natural, passions, reasonings, and notions themselves, that perhaps there is not any one thing that deserves more to be looked after (p. 222).

In the rather brief passages in his works concerned with the association of ideas, contiguity and similarity are implied but not specifically referred to. It is as if Locke did not feel it necessary to state the obvious. The most important distinction he seems to be drawing between the normal relating of ideas and association of ideas, in his sense, is the distinction between an active and passive mental process. For Locke, the acquisition of true knowledge depended upon the active manipulation in the mind of simple ideas in the ways already mentioned. By contrast, false knowledge he considered to be the result of the passive absorption of simple ideas already compounded into a relationship in the world of sense. He believed that any mental manipulation of such compounds was bound to lead to error since they had not been reduced to their constituent parts to begin with and their apparent relationship was a false one depending upon custom, habit, education and other accidences of circumstance.

If we read Locke literally then we must conclude that he has nothing positive to say which would enhance our understanding of the association of ideas. If, however, we recognize that he used this term in a very special way[9] then we are free to read Book II of the Essay, "Of Ideas", as a treatise on the association of ideas in the sense in which that term is most commonly employed today. In so doing we find reference, in chapters 26 and 27, to all the obvious forms of relationship: "identity and diversity", contiguity in time and space, and even "cause and effect", in which he anticipates Hume. However, his remarks on these subjects are again brief and hardly provide the basis for a theory of associationism. For that we must look to the work of

his successor, David Hume whose remarks on the subject of association of ideas appear to be more thorough and consistent than those of Locke.

David Hume (1711-1776). Hume, like Locke, was unaware of the earlier contributions to association theory [10] and, like Locke, he wanted to develop a new epistemology based on experience to replace the decadent metaphysics of the past ((1739), 1961).

> Principles taken upon trust, consequences lamely deduced from them, want of coherence in the parts, and of evidence in the whole, these are everywhere to be met with in the systems of the most eminent philosophers (p. xi).

Hume's basic epistemology and his most complete statement about the association of ideas can be found in the work from which this passage is taken, A treatise of human nature. He later denounced this book as juvenile but many commentators consider it to be the boldest and most original expression of his philosophy. [11]

The term, association of ideas, was used by Hume to refer to the process through which the mind actively converted simple ideas into complex ones and he believed that the three main facilitators of this process were: resemblance, contiguity in time or space, and cause and effect. The last he considered to be by far the most effective. This is interesting in that it is the only one which is not phenomenal. The fiction of cause must be imposed on the phenomenon by the knower, as Hume pointed out.

Hume argued that when the causal relationship is closely examined the two relations of contiguity and succession are always found behind it ((1739), 1961, p. 70). But if causality is only a mental construct, then why does Hume consider it the most important form of association? Causality cannot be logically analyzed since, according to Hume, our

idea of it derives from our experience (p. 82).

> We have no other notion of cause and effect, but that of certain objects, which have been always conjoined together, and which in all past instances have been found inseparable (p. 85).

And Hume goes on to say

> Thus, though causation be a philosophical relation, as implying contiguity, succession, and constant conjunction, yet it is only so far as it is a natural relation, and produces a union among our ideas, that we are able to reason upon it, or draw any inference from it (p. 86).

His implication would seem to be that the apparently causal connection between two phenomena, which appears as given, provides a powerful metaphor to stimulate the mind to form or recognize causal connections in cases which are not so obvious as these.

Analogical thinking, as this process is now called, is generally accepted as a form or aspect of creative thinking, but Hume did not talk of creativity directly. However, when considering the origin of ideas in his Enquiry concerning human understanding ((1758), 1965), he does refer, at one point, to the "creative power of the mind".

> What never was seen, or heard of, may yet be conceived; nor is any thing beyond the power of thought, except what implies an absolute contradiction.
>
> But though our thought seems to possess this unbounded liberty, we shall find, upon a nearer examination, that it is really confined within very narrow limits, and that all this creative power of the mind amounts to no more than the faculty of compounding, transposing, augmenting, or diminishing the materials afforded us by the senses and experience (pp. 53-54).

We interpret these remarks (our emphasis) to mean that the kind of thinking which leads to the acquisition of knowledge is creative thinking and that it was for the purpose of explaining this sort of thinking that Hume developed his theory of the association of ideas.[12] It seems to us that what moderns mean by creative thinking is what Hume

meant by thinking, in any significant, productive sense.

David Hartley (1705-1757). Drever (1968) has dismissed Hume's associationism, saying it ". . . appeared as a theory advanced without solid factual evidence, and stated in terms which were psychologically indefensible (p. 15)." For him and for many psychologically minded commentators David Hartley is taken as the most appropriate starting point for a study of the modern history of the association of ideas. Hartley, a physician by training, is referred to by Drever as "the first unconditional associationist (p. 14)." Brett ((1912), 1962) refers to him as the originator of physiological psychology and points out that he was the first to provide a definite physiological basis for the associative process (p. 437).

Hartley's main goal in this area was the establishment of a physiological law of association. Association of ideas was only an adjunct to this. His doctrine of vibrations was designed to show how sensations could get from the nerves to the brain and be translated into appropriate responses which were then transmitted to the muscles. The elements of his system were vibrations and the relation of these elements he called associations. These associations he considered to be either of sensations or of the ideas of these sensations, "the residual vibration which is left when the object ceases to act on the sense organ . . . (Brett, p. 440)".

Hartley's physiological theory is no longer of direct relevance to psychology but by providing a material basis for ideation he transformed the philosophical doctrine of associationism into a viable psychological explanation of mental processes. As Brett says

> In thus establishing a connection between sensation, ideation, and motion Hartley gives to association a meaning quite distinct from that given it by Locke or Hume. A closer analogy would be found in Hobbes, and, through Hobbes, in Aristotle. For this is not merely a way of saying that we have trains or sequences of ideas; it is rather an attempt to exhibit man as a microcosm, a world ruled by law and by the laws of the universe outside him (p. 440). [13]

However, the doctrine of associationism, itself, which he inherited from Locke, was not improved upon significantly by Hartley. His early training was as a cleric, not a philosopher, and this is reflected in his basic philosophical position which Brett describes by saying

> . . . he was at heart an occasionalist and occasionalism was a very appropriate theory for one who combined physiology with theology (p. 438). [14]

John Stuart Mill (1806-1873) and Alexander Bain (1818-1903).

After Hartley and Hume the history of associationism can be traced through the Mills and the Scottish "Common Sense" School to its conclusion as a separate movement, in the work of Alexander Bain, a contemporary and friend of J.S. Mill. Like Hartley, Bain was a psycho-physical parallelist who tied his doctrine of association to a physiological framework, but unlike him Bain did not believe that the laws of association could account for all cognitive processes.

Bain worked out his own version of the laws of association as did many of the other early associationists. The first two are already familiar to us from Aristotle: (1) law of contiguity and (2) law of similarity. The third one is: (3) law of compound association, i.e. associations which alone are too weak to revive past experiences may together be strong enough to do so. The last one, and the one which is of considerable interest from our point of view, is: (4) law of constructive association (Bain, 1894).

> By means of association, the mind has the power to form new combinations or aggregates, different from any that have been presented to it in the course of experience (p. 604).

He goes on to say that ". . . the operations known by such names as Imagination, Creation, Constructiveness, Origination, Inventiveness . . .(p. 604)." account for these new combinations. Bain's basic point, which he reiterates frequently throughout his entire discussion of mental association, is that all novel ideas, no matter how ingenious and original they may appear to be, are combinations derived from elements already possessed by the mind in accordance with one or more of his four laws of association.

It seems reasonable to assume that in the forming of his last law of association, Bain was influenced by his life-long associate, John Stuart Mill. The younger Mill also formulated four laws of association although his last two, (3) frequency and (4) inseparability, differ from Bain's last two, but it is for his concept of mental fusion that he is chiefly remembered by associationist commentators.

What is unique about Mill's systematization is that he considered his laws to be interdependent aspects of the general principle of association rather than independent principles in themselves (Vinacke, 1952, p. 14). His system has been called mental chemistry because he suggested that the mechanical model of association proposed by his father, James Mill, be replaced by a chemical one. Basically, he proposed that a fusion may sometimes occur between juxtaposed elements which would allow for the production of new elements. His analogy was the fusion of two chemicals so that a completely new product is formed and neither of the original products remain. This has obvious

implications for the development of a naturalistic explanation of creation ex nihilo but it has received no confirmation through modern psychology and Mill, himself, did not carry it beyond the realm of speculation.[15]

Bain was the last of the early British associationists.[16] Historians then trace the development of associationism to the continent where it goes in several directions, ranging from the almost pure sensationism of Condillac to the mental chemistry of Taine. For our purposes, however, we need only make a few general observations about associationist theory during this period. Our remarks will be largely based on Warren's (1921) very thorough history of the subject.

French Associationism

Among the French associationists there was much concern with revising and simplifying the laws of the earlier associationists. Pierre Maurice Mervoyer (1805-ca.1866), one of the leading exponents of this movement, made an interesting distinction between what he saw to be the two great principles of association: continuity (contiguity) and resemblance. He considered the former to be objective and the latter to be subjective. His reasoning was that he thought the law of continuity was the most important in perception and the law of resemblance was the most important in cognition.

Hippolyte Adolphe Taine (1828-1893) may be regarded as the culmination of the French association movement because he was the last associationist in whose work the traditional method of introspective analysis still dominated. There one finds a clear formulation of the mental chemistry that was only hinted at by J. S. Mill. However, his

interests were more epistemological than psychological and had little to offer to the later association psychology. [17]

German Associationism

The emphasis Warren places on the French associationists is not shared by all historians. Mandler and Mandler (1964) see the British associationists, Hobbes, Locke, Hume, the Mills, Hartley and Bain, as one link in a chain of the history of thinking which then

> . . . jumps the Channel to Germany - particularly to Wurzburg - and continues via the immediate results of the Wurzburger revolution to the early days of Gestalt psychology. This particular tradition battled with the problems of imagery, directed thinking, and the unit of thought (p. 5).

Warren, on the other hand, suggests that the Germans were not generally sympathetic to associationism but he means this in the sense of associationism as armchair psychology.

> The associational analysis had gone as far as it could by the sole use of the introspective method. Something corresponding to the laboratory investigations used in chemistry and physics was needed to determine the relative strength of the associative processes. When these investigations were actually under way, they suggested new experimental problems. Association thus came to be viewed not as the fundamental process of human mind, but as one among several processes, each complex and interwoven in the total manifestations of consciousness (p. 214).

The German phase marked the end of associationism as a separate movement but their experimental studies of association problems gave such renewed vitality to this subject that it remains of central significance to the whole study of psychology to the present day. Hermann Ebbinghaus (1850-1909) was one of the earliest investigators of these problems.[18] He studied the strength of association as determined by repetition and lapse of time, using nonsense syllables to

ensure the equivalency of the material. His studies served as a model for many others including those of Alfred Jost who is chiefly remembered for the two following principles which are known as Jost's Laws (Warren, 1921).

> 1. If two associations are of equal strength but of different age, a fresh repetition increases the value of the older more than the newer.
>
> 2. If two associations are of equal strength but of different age, the older decreases less with the course of time (p. 220).

The influence of these laws on modern learning theory is self-evident.

Many of these early experiments, especially those on the reaction time of association, were done in the Leipzig laboratory under the supervision of Wilhelm Wundt. The first of these were carried out by James McKeen Cattell in 1887. He brought the German influence back to his native America where it was to have far reaching effects on the subsequent course of American psychology.[19]

Wilhelm Wundt (1832-1920). The work of Wilhelm Wundt marks the beginning of the end of associationism as a separate psychology and introduces a new phase into the history of creativity theory. While the experimental studies done in his laboratory in the 1880's and 1890's made associationism operationalizable for the first time, thus ensuring it a place in modern psychology, they did so by incorporating it within the larger theoretical context of learning theory. After Wundt, associationism could no longer be regarded as an independent psychology with a separate theoretical base of its own.

Although Wundt is chiefly remembered for his experimental work and is referred to as the father of experimental psychology, the work which

came from his famous Leipzig laboratory represents only one side of Wundt's psychological thinking. He wrote voluminously on various psychological issues and there is an introspective, philosophical orientation to much of his theorizing which remained uninhibited by the demands of empirical science which ruled his laboratory.

Warren (pp.223-224) considers Wundt's theoretical contributions to association theory, based on his distinction between association and apperceptive connection, to be even more important than his experimental ones. Our own thinking is that Wundt's theory of apperception represents not so much an elaboration of associationism as an evolution beyond it. It serves as an important link between associationism and modern creativity theory by bringing a very different line of thinking to bear on the association issue than that advanced by the early associationists. The roots of this line of thought are in German idealism and Wundt is only one of a number of psychologists who were influenced by this philosophy and whose subsequent contributions to creativity theory bear its mark. An examination of this line of influence, German idealism, will be the subject of the next chapter and Wundt's theoretical contributions to creativity theory will be considered in that context.

Chapter II - Notes

[1] Historians differ greatly in their opinions as to who the dominant figures of the early associationist movement are. This is due largely to differences in their definitions of associationism. Warren (1921), for example, holds to the strict interpretation that associationists are only those who accept the principle of association of ideas as a total explanation for human thought and emotion. Others accept a more relaxed definition which allows them to include as associationists thinkers like Locke and Hume who Warren refers to as "precursors" to the movement.

[2] Warren (1921, p. 13) gives a good example of this. He mentions that the Scottish intuitionists, faculty psychologists such as Reid, Stewart and McCosh, combined an associationist philosophy with a nativist psychology. Since a strict associationism would necessarily entail a denial of innate ideas, the position referred to here could only be consistent if a much looser definition of associationism were employed.

[3] For a modern operationalized form of associationism we would have to turn to the model offered by Sarnus Mednick (1962, 1963). However, it is too atypical to be considered representative of the whole tradition. It will be discussed in some detail in Part II of this thesis.

[4] Relevant contributions to associationism from the original works of Aristotle, Hobbes, Locke, Hume, Hartley and Bain which were too long to incorporate into the body of the text are included as a separate appendix (C). Some additional commentary from secondary sources and a brief explanation of Aristotle's principles of association is also included.

[5 and 6] See Appendix C.

[7] For a discussion of this point see Lamprecht (1928, pp. xliv-xlvi). He points out that Locke retained the Cartesian belief in the rational nature of the world even while denying that man's mind was equipped to understand it. It might be added here that Locke remained a strong Christian throughout his life, a position not compatible with a thoroughgoing empiricism.

[8] An active/passive distinction of mind can be found in Plato, Aristotle, and many of the other early associationists, including Locke. It will be discussed at a later point in the thesis. However, we might just point out that Locke's remarks on the active manipulation of ideas anticipate Kant's "Einbildungscraft", the constitutive imagination.

[9] Hume points out the unusual meaning that Locke gives to idea, i.e. perception. Behind his objection to this and certain other terms in Locke's theory was his objection to the faculty psychology they presupposed. Association of ideas was not for Hume simply an explanation

for the contents of the mind. It was the mind. It was for this reason, i.e. to avoid mentalistic terms, that he replaced Locke's sensation and reflection by impression and idea, respectively.

10 See Hume ((1758), 1965) Section III,"Of the association of ideas" , p. 57, for substantiation of this point.

11 See Appendix C.

12 Like Hobbes and Locke before him, Hume downplayed the imagination, equating it with "fancy" ((1939), 1961, p. 11). His basic distinction is between the perceptions of the mind and the ideas which result from them. The former, which he calls impressions, are characterized by a "greater force and vivacity" than the latter which he calls ideas and which he sees to be but "faint copies" of impressions. Hume also subdivides ideas by the same criterion. The "more lively" ones derive from the memory while the weaker but more versatile ones derive from the imagination (pp. 8 and 9). For a further discussion of this distinction see Mandler and Mandler (1964, pp. 57-58). For a consultation of the passages in question see Appendix C.

13 See further quotations from Hartley in Appendix C.

14 Occasionalism is a theory of knowledge which holds that mind and matter are non-interactive but that events in one realm occur in correspondence with events in the other. It differs from other forms of psycho-physical parallelism in holding God to be responsible for this.

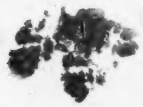
15 According to Warren (1921, pp. 65-67) Abraham Tucker anticipated Mill's mental fusion and criticized Hartley for regarding the mind as a mere passive receiver of impressions. For some citations from Tucker, see Appendix C.

16 From 1855 on, association theory in Britain was best represented by social psychologists and biologists such as Herbert Spencer and Sir Charles Darwin who operated from the assumption that mental associations are inherited by the race and that in individuals we see only particular applications of these laws.

17 For a further discussion of Taine's position see Warren (1921), chapter seven.

18 The work done by Ebbinghaus (1885) and by the Wundt laboratory was largely an elaboration and clarification of experimental investigations on association published in Great Britain (in Brain) by Francis Galton in 1879.

19 Many Americans who later became prominent psychologists in their own country studied in pre-war Germany, spending at least part of their time in Wundt's labororatory. Thus German psychology had considerable influence on the development of American psychology, before the communication breakdown caused by World War One.



CHAPTER III

German Idealism:

Its Relationship to Modern Creativity Theory

For over 200 years, from the publication of Hobbes' Leviathan in 1651 until the publication of Bain's The senses and the intellect in 1855, association theory dominated British psychology. This is not to say, however, that there were no dissenting voices to the mechanism upon which it was based. The Cambridge Platonists, in the second half of the seventeenth century, looked back to the Platonic tradition for a mode of defence against Hobbsian materialism. One of their leading protagonists was Ralph Cudworth (1617-1688). The modern literary historian, Brett (1969) describes Cudworth's argument against Hobbsian reductionism as follows.

> In particular Cudworth repudiated Hobbes' account of how we perceive and come to have knowledge. Against Hobbes' empiricism he elaborated an idealist philosophy which saw the mind as creative and active in perception rather than as the passive receptacle of sense impressions from the external world. To illustrate this he takes as an example our perception of a white triangle. On Hobbes' theory our perception is simply the association of sense data such as the whiteness, the triangular shape, and any other sense qualities which constitute the appearance of the triangle. Cudworth declares that such an account omits the power of the mind to perceive objects as objects (p. 22). 1

It is not surprising that Cudworth and his associates should have turned to Plato in this battle against associationism for Plato's conception of the human mind is very different from that which

comes down to us from Aristotle. Although both of them recognized the existence of mental associations, Platonic nativism implies that the mind is active while Aristotelian empiricism suggests that it is passive and controlled by external circumstances. In his discussion of imagination Vinacke (1952) distinguishes between Plato and Aristotle as follows. He says that for Plato

> Imagination is mental activity in sensuous form, accompanying sensation, memory, and other mental processes. In general, the mind has many functions arranged in logical fashion from low to high. It differs from sensation because it deals with objects not sensibly present.
>
> . . . .
>
> Aristotle's conception of the mind rests upon the basic idea of motion. One might say that mental processes are inner motions which persist after initial stimulation through the senses. Images, as noted above, are fainter replicas of the sensation. Memory is a kind of storing up of sensory motions, and recollection as an active process is the stirring up of a train of imagination. Imagination is thus basic to all thinking (p. 11).

The connection between Aristotle and Hobbes has often been commented upon and, in terms of Vinacke's interpretation at least, it is possible to see here an anticipation of Hartley's physiological basis for association. Platonic nativism, on the other hand, has its modern counterpart in Scottish intuitionism which, as Warren (1921) observes,

> . . . exhibits the spirit of associationism in its philosophy and the spirit of the a priori movement in its psychology, though differing from both in the form of its doctrines. Thomas Reid, Dugald Stewart, and their followers, and more recently James McCosh, regard mind as a collection of faculties, each fully capable of performing its functions from the beginning - the memory capable of remembering, the rational faculty of reasoning, the perceptive faculty of perceiving objects as they exist in the outside world. But while their psychology is thus furnished with a priori elements for knowledge, the actual rise of knowledge is regarded as strictly empirical (p. 12).

The link between Plato and the Scottish School is not in the source of knowledge which the latter saw as "strictly empirical" but which for Plato, according to his doctrine of recollection, was super-natural.

> . . . for a poet is a light and winged thing, and holy, and never able to compose until he has become inspired, and is beside himself, and reason is no longer in him. 2

It is rather in their shared faculty psychology that they are alike in that both considered the mind to be, structurally and functionally, an inborn entity. Both saw it as an agent actively acquiring knowledge through the senses. For Plato, however, this sensory knowledge only functioned as a facilitator to the recollection of ideas already present in the pre-existing soul. But for the intuitionists, these sensations, once perceived and stored, provided the material basis for ideation. It is when faculty psychology is given this naturalistic interpretation that its circularity becomes obvious. 3

Although Aristotle shares with Plato a belief in the pre-existence and immateriality of the soul, and within this overall context might be said to share in Plato's faculty psychology, his conception of thinking is radically different from Plato's theory of mind, as Edwards ((1967), 1972) points out.

> Thinking is treated by Aristotle as analogous to perceiving. The mind is related to intelligible objects in the same way that sense is related to sensible objects. It is thus impassive and is itself nothing but potentiality (namely the potentiality of receiving forms), and it has no form of its own (V. 1, p. 158).

It is not possible to trace clear lines of intellectual descent from Plato's active view of mind and Aristotle's passive view of mind because their respective philosophical and psychological doctrines have been translated, confused and incorporated piecemeal into other

metaphysical theories through the ages. However, there appear to be sufficient grounds for assuming that such a distinction does exist and that it has biased modern theories of creativity and intelligence in one direction or the other. To make that distinction obvious is one of the main tasks of the present chapter. This will be done by examining 17th and 18th century English and German idealism and those philosophical and psychological systems evolving from it which we have found to be forerunners of modern creativity theory. One way to distinguish between idealists and materialists, including associationists, is in terms of their active versus passive views of mind respectively. We believe that one or the other of these views of mind underlie most of the modern creativity literature and it is for that reason that we are contrasting the associationist and idealist points of view and examining them both in some detail.

Baron Gottfried Wilhelm Von Leibniz (1646-1716). The recognition of the historical distinction between an active and a passive view of mind and his adherence to the former position are central issues in the writings of the famous German philosopher, Leibniz. In the Preface to the Nouveaux Essais he distinguishes between his philosophy of mind and that of his British contemporary, John Locke.

> Our differences are upon subjects of some importance. The question is to know whether the soul in itself is entirely empty, as tablets upon which as yet nothing has been written (tabula rasa) according to Aristotle and the author of the Essay, and whether all that is traced thereon comes solely from the senses and from experience; or whether the soul contains originally the principles of many ideas and doctrines which external objects merely call up on occasion, as I believe with Plato, and even with the Schoolmen, and with all those who interpret in this way the passage of St. Paul (Rom. ii, 15), where he states that the law of God is written in the heart (cited by Hibben, 1910, p. 162).

Paul Janet states (Montgomery, 1962) that

> In restoring to created substances the activity which the Cartesian school had too much sacrificed, Leibniz thought to contribute to the clearer distinction between the created and the Creator (p. xv). 4

This emphasis on activity was to significantly affect the subsequent direction of German psychology through later thinkers such as Herbart, Beneke, Kant and Wundt. However, Leibniz was not the only such influence on the German Enlightenment.[5] The active view of mind was also upheld by some widely read British thinkers during this period. One person who stands out particularly as a Romantic influence on German philosophy during the enlightenment and on the subsequent philosophy of Immanuel Kant was the Third Earl of Shaftesbury.

Anthony Ashley Cooper (1671-1713): Lord Shaftesbury, a British contemporary of Leibniz, was one of the first philosophers to reject the associationism of Hobbes and Locke, particularly as an explanation of imagination. He believed that an active principle in the poet's mind is the shaping spirit of imagination (Brett, 1969, p. 26). The less gifted writer might produce his poetry by an associationist process of dredging up from memory related ideas through "an injudicious random use of wit and fancy (Shaftesbury (1711), 1900, p. 178)". However, the "real master" works in a very different way.

> Such a poet is indeed a second Maker; a just Prometheus under Jove. Like that sovereign artist or universal plastic nature, he forms a whole, coherent and proportioned in itself, with due subjection and subordinacy of constituent parts (pp. 135-136).

This Romantic view of art relies heavily on the Creator analogy and, as such, does not provide the ground for a naturalistic alternative to

associationism. Such a view was not to appear in England for another 100 years by which time, unknown to its author, it was already extant in Germany in the writings of Immanuel Kant.

Samuel Taylor Coleridge (1772-1834): Although he apparently never read Shaftesbury, the associationist explanation of imagination is dismissed by Coleridge in much the same fashion as it was by his predecessor. Coleridge agrees that a certain kind of poetic imagination, which he calls fancy, can be explained as memory images brought together by association. But to this he contrasts "true imagination" which can either be primary or secondary. It is the second form which Coleridge ((1817), 1907) conceives to be the true poetic imagination and he describes it as

> . . . an echo of the (primary imagination) . . . . It dissolves, diffuses, dissipates, in order to re-create: or where this process is rendered impossible, yet still at all events to idealize and to unify (p. 202). 6

This "dissolving-recreating" process is reminiscent of J. S. Mill's chemical fusion and one wonders if Mill, despite his strict education, was familiar with the ideas of his Romantic predecessor? What is even more striking than this, however, is the resemblance between Coleridge's theory of the imagination and that of Immanuel Kant. According to Coleridge (1895, pp. 735-36), he did not read Kant until many years after his basic ideas on the imagination were formed. He was familiar with Leibniz and his theory of apperception, however, and that appears to be the link between the two writers.

Just as Coleridge recognized that fancy was an associative process so he acknowledged that there was a passive, as well as an

active, side of mind ((1817), 1907).

> There are evidently two powers at work, which relatively to each other are active and passive. . . (p. 86).

But Brett (1969) points out that Coleridge was basically a vitalist

> For Coleridge, as for Cudworth, there was a parallelism between a vitalistic conception of nature and a view of the mind as creative in knowledge. As God created the world out of Chaos and gave it order and form, so the human mind imposes order and form upon the raw material of sensation. The human mind can do this because it is made in the image of the Divine Mind and is truly creative.
>
> . . . .
>
> . . . in a very real sense, the human mind creates the world it perceives, and because this is possible, there must be a reciprocity between the world of perception and the faculties of the mind.
>
> . . . . . .
>
> The power which enables us to relate the two worlds of mind and nature is the imagination (p. 41).

We believe there are definite naturalistic elements in Coleridge's theory of the imagination, as pointed out by Lowes (1930). However, because of the vitalism and theism in which it is submerged it has not been recognized historically as providing an alternative psychology of mind to associationism. For that we must turn to the theory of imagination advanced by Immanuel Kant which, despite the chronology[7], seems in many ways to be a refinement and elaboration of Coleridge's basic position.

Immanuel Kant (1724-1804): Whatever the originality of Coleridge's insights, it was Kant who provided a complete and systematic theory of the imagination which took into account both the empiricist and the rationalist conceptions of mind prominent in his time. It is his system which provides the starting point for much modern non-mainstream creativity theory. However, this is rarely recognized by psychologists.

The great psycho-historian, Brett ((1912 - 1921), 1962), says that

> Many would regard the legacy of Kant as a disaster for psychology. It perpetuated the rigid distinction between the outer and the inner with its accompanying assumptions both that there is a radical difference between what we know of our own minds and what others know of them and that overt behavior alone can be scientifically described (p. 534).

Kant's great backward step for psychology was to reaffirm the essential discontinuity between man and his environment which the associationists had denied. Yet he was not, in his mature thought, a Platonist and his references to faculties were, as they had been for Locke [8], but a convenient way of speaking. In fact, Kant's Anthropology has been described as the real beginning of "psychology without a soul (Brett (1912-1921), 1962, p. 534)." [9] He did not deny the reality of the soul but only maintained that it could not be dealt with under the rubric of psychology since psychology is an empirical discipline which can only study phenomena, i.e. "Appearances, so far as they are thought of as objects according to the unity of categories (Kant ,1781)."

Like Hume, Kant focused on epistemology as the key to philosophical issues. His Critique of pure reason ((1781), 1787) is basically a demonstration of the necessity of synthetic a priori judgments. As Hibben (1910) says

> Kant conceives the fundamental nature of thought in all of its phases as synthetical, that is, as possessing a capacity to build together the elementary fragments of knowledge which are given in experience so that they form a systematic and ordered whole and thereby become intelligible.
>
> . . . .
>
> Kant's idea of the constructive power of the understanding is far more fundamental than (Locke's conception of the mind's activity). Not merely are the fully formed products of thought skilfully ordered by the mind, but at the very threshold of knowledge itself, where the crude elemental material is furnished through the senses, the mind is already actively engaged in fashioning and informing the given

material according to its own native powers.

. . . .

(Even the simplest perception) is essentially a process of transmutation and not of mere passive reception and transmission (p. 229).

The fundamental and very early assumption upon which all of Kant's subsequent theorizing was based was his distinction between noumena, things-in-themselves, "the object of a non-sensible intuition, that is, of the understanding"(Kant (1781, 1787) 1965, p. 266ff.) , and phenomena. Only the latter, i.e. things in the world as they appear to us through the evidence of our senses, are directly knowable. The question, then, is how do we know phenomena? This is possible, according to Kant, only through the fulfilment of certain conditions which, for convenience, he labels as the three faculties of sensibility, understanding and imagination. [10] It is his concept of the imagination which has significance for the history of creativity research.

For Kant the imagination is primarily a synthesizer. That is to say, it is the imagination which organizes raw sensation into intelligibly connected patterns, thus making possible our perception of the world (Kant (1781, 1787), 1965).

> Now it is imagination that connects the manifold of sensible intuition; and imagination is dependent for the unity of its intellectual synthesis upon the understanding, and for the manifoldness of its apprehension upon sensibility. All possible perception is thus dependent upon synthesis of apprehension. . . (p. 173).

The imagination generates the spatio-temporal framework in which sense awareness occurs. Association of ideas is possible because the productive imagination has the power to structure things so they are reproducible. Without this reproducibility no knowledge would be possible. It is the reproductive imagination which allows for

comparistons and contrasts, i.e. associations, and many see that as the source of creativity in Kant's theory (Wheelwright, 1968).[11]

> There is an essential continuity between Kant's 'Einbildungskraft', the constitutive imagination which actively molds the world and gives it form in our every attempt to understand it, and the poetic imagination which cannot entirely break off from the constitutive without forfeiting its genuineness but which extends, enriches, qualifies, playfully laughs at, and throws into dialogical doubt the caked familiarities that get taken for 'reality' when poetic sensitivity is at a minimum (p. 34).

This Romantic view of the role of the reproductive imagination in Kant's system has certainly had an impact on modern creativity research, primarily through literary theorists. However, a more significant impact would seem to be in quite another direction and to appreciate this it is helpful to remember that Kant considered the imagination to be the lower faculty of the understanding. It is the synthesizer but the understanding is the knower in the sense of giving meaning to that which is imaginatively perceived. While the imagination operates freely in its synthesis, and must do so to provide sufficient organization for the understanding to be able to impose its cognitive order, nonetheless there is no cognitive apprehension until the understanding is brought into play.

Kant looked on imagination as the synthesizing capacity through which the data of sense and the organization of it are brought together to constitute knowledge as against mere perception or imaginative fancy. What imagination achieves through its synthesis is precisely the unity of consciousness. This unity is referred to by Kant as the unity of apperception and he considers its presence in the mind as a logical necessity if consciousness is to be possible at all.

Kant's critical idealism had a profound impact on the subsequent direction of German philosophy and psychology. His emphasis on the unity of apperception has been particularly important to post-Kantian psychology and phenomenology. Although introduced by Kant as a purely logical category it has often been given a more substantial role by his successors [12] and, in keeping with this, Idealists have insisted from Kant onward that thinking is an activity.

These two elements in Kant's thinking: (1) his emphasis on the active rather than the passive nature of thought and (2) his emphasis on the unity of consciousness, stand out as having particular significance for modern creativity theory. These themes have also played a prominent role in the history of structuralism, Gestalttheorie and phenomenology which in turn have influenced the development of creativity theory, in these and other ways. Their contributions to the view of thinking as an activity will now be considered.

Structuralism

Wilhelm Wundt (1832-1920). Wundt is remembered as the father of experimental psychology because it was in his Leipzig laboratory, as already mentioned, that much of the early experimental work in psychology was done. [13] However, there is another side to Wundt, a theoretical and philosophical side, that is being rediscovered today, and it is in this area that he must be looked to for his influence on modern creativity research.

In working out his systematic psychology Wundt was influenced both by the British associationists, especially J. S. Mill, and by the German philosophy of his day. [14] He followed Leibniz in his parallelist

treatment of the mind-body problem but limited the mental to the realm of conscious events. Wundt designated the basic mental activity apperception,[15] a unifying function which he understood to be an activity of the will. The qualities of will and attention in the apperceptive process are emphasized even more by Wundt than they were by some of his predecessors and he gives a new emphasis to the role of emotion in cognition (Edwards, (1967), 1972).

> In his Grundriss der Psychologie, Wundt distinguishes between passive apperception, in which the consciousness simply accepts impressions, and active apperception, in which the new impression is met by an emotional state of tension followed by a sense of satisfaction. Furthermore, in all apperception a personifying element is at work in that the apperceived objects are coloured by the mode of the apperceiving subject. This is the reason why we tend to identify apperceived objects with our own form of existence (p. 139).

Many of the experiments which were done in the Leipzig laboratory were designed to show that association is not enough in itself to account for the facts of mental experience and that the additional construct of apperception is essential (Humphrey, 1968, p. 284). But Wundt still considered association to be an important process. Like J. S. Mill, he talked of a fusion of elements into complexes. Yet, as Thomson (1974) says, the big question for Wundt was

> What integrates these elements and gives the mind its unity: Wundt used the term 'apperception' to describe the process whereby certain elements are focused and made dominant in consciousness. The organization which follows an act of apperception was a complex act of 'creative synthesis'. Thus any reaction could be analysed in terms of the scheme: Stimulation - Perception (mere presentation of sensa in consciousness) - Apperception (identification, appropriation, synthesis) - Will (feelings summate to emotive-drive issuing in action).
>
> The analogy with J. S. Mill's psychology is close. Both men adopt an atomistic approach to the field of consciousness,

> modified by an emphasis on the unity of the subject, the activity of the whole being towards purposeful action (p. 71).

In Wundt we find a breaking down of traditional dichotomies. A priorism coexists side by side with associationism and the active with the passive mode of thought. Without these dichotomies to blind him, a new element in human consciousness emerged for Wundt: purposiveness. His creative synthesis entails purposiveness not in the old Aristotelian sense of teleology but in a new naturalistic sense of goal-orientedness. Although barely implied in his system, this is the same sort of purposiveness which was subsequently expounded by McDougall in his instinct psychology and by Tolman in his purposive behaviorism.[16]

There can be no suggestion that the parallel insights of Wundt and McDougall were causally related. Although Wundt's general system and his technique of introspective analysis were preserved and developed by his student and translater, Edward Titchener (1867-1927), the dynamic side of Wundt's thought was largely overlooked. In fact, some historians credit Titchener with ultimately destroying structuralism due to his rigid interpretation of it.[17] Because of this and also because of the breakdown of communication between German and American psychologists caused by World War One, Wundt's system has never been fully understood and appreciated for what it is in North America. Therefore, it has exerted very little direct influence here. Gestalttheorie, on the other hand, has been readily accepted and largely integrated into mainstream American psychology. We turn next to an examination of it.

Gestalttheorie

Max Wertheimer (1880-1943); Kurt Koffka (1886-1941); Wolfgang Kohler (1887-1967). Gestalttheorie, as an independent theory of psychology, is generally dated from 1912 when Wertheimer published his classic article on the phi phenomenon.[18] However, the term, Gestalt, and many of the basic Gestalt tenets were originally introduced by Herbart (1825) in his book, Psychology as a science.[19] But the Zeitgeist was not ready then. In fact, it took much of 19th century German psychological thought to create this Zeitgeist which was to prove so receptive to the new Gestalttheorie.

The emphasis of Wertheimer, Kohler and Koffka on describing rather than analyzing the givens of experience was phenomenological but, as Boring ((1929), 1950) indicates, it is too simple to view Gestalttheorie as developing out of phenomenology. Rather, other factors operating in the Zeitgeist of the times affected the development of both (p. 600). Gestalttheorie, he says, can be best understood as a reaction against these:

1. Phenomenological description vs. Analysis into elements
2. Emergence of form in wholes vs. Associative congeries
3. Meanings and objects vs. Sensory contents (p. 601)

There were two major sides to the early German psychology: act psychology and content psychology. The two have often been presented in contrast to each other by historians and many would argue that the Gestalt movement is but a continuation of the former. However, there are certain similarities between the school of act psychology and the school of content psychology, i.e. Wundtian structuralism, which are significant for our purposes and which support Boring's argument that

both Gestalttheorie and phenomenology grew out of a common substratum in German thought.

Act psychology and content psychology compared. Act psychology, in the sense of theorizing about the activity of the human mind, is as old as Aristotle. It was reintroduced in its modern form in 1874 with the publication of Brentano's Psychology from an empirical standpoint.[20] He defined psychology as the science of psychical phenomena, i.e. the acts of a person. These acts (mental processes) he considered to be of basically three different types: sensing (including ideation), judging and feeling. Brentano's psychology differs from the older act psychology in the stress which Brentano placed on the act of experiencing. Intentionality was his term for this, meaning that thinking only exists as a momentary act between a perceiving subject and a perceived object.

Brentano's holistic and dynamic approach to psychology, i.e. his emphasis on the entire act of experiencing, has often been contrasted with Wundt's "static elementism" (Marx and Hillix, 1963).[21] Yet the opposition between what we might term Brentano's process psychology and Wundt's product psychology seems to be due to a misunderstanding, in part. While Wundt's elementism cannot be gainsaid, the frequent description of his system as a static elementism can be (Marx and Hillix, 1963).

> Wundt's attitude toward the thing analyzed, toward consciousness, left some room for ambiguity. He explicitly talked about mental process, not mental contents (1894, p. 236): 'As a matter of fact, ideas, like all other mental experiences, are not objects, but processes, occurrences.' (p. 63).

Like many psychologists of his day, and many recent ones, he did attempt to model psychology on the hard sciences but the basic analogy he drew was with chemistry,[22] not physics. When his fusion analogy is

viewed in this light it seems very close to Act psychology and Gestalttheorie, and very far removed from the passive view of mind so often associated with it. In his interpretation of Wundt's view of mind, Sahakian (1975) says

> The human mind is not a passive substance, but an activity, an actuality, a process. In the natural sciences experience is mediate, whereas in psychology experience is 'immediate and underived'. Appreciating this distinction of the two phases of one experience, 'the concept of a mind substance immediately gives place to the concept of the actuality of mind as a basis for the comprehension of psychical processes.' (1907, p. 361). The mind is not a thing, a substantial entity, but an ongoing process, a phenomenal activity, a mental process that is active (p. 151).

If, as would appear to be the case, the only real difference between Act psychology and the original Wundtian content psychology is a difference in emphasis, i.e. holism vs. elementism, then their differences can be seen to be methodological rather than theoretical. Wundt's introspectionism, i.e. controlled observation of the contents of consciousness under experimental conditions, was unacceptable to the Gestalttheorists, among others, because it attempted to render the dynamic static in order to analyze it. They saw this as a highly artificial technique out of which no good could come. However, if the above interpretation is valid, then Wundt must also have been aware of the artifice involved but simply unable to devise a more appropriate but still scientific technique. This, i.e. a controlled but holistic approach to psychological problems, was just what the Gestalttheorists contributed to psychology, rather than any particularly new conceptual material.[23] Act psychology, Structuralism and Gestalttheorie, we can conclude, were all heavily influenced by German idealism in that they all viewed the mind as being of an a priori and constituting nature.

Gestalt theory and method. It is well established by historians that the Gestalt theorists borrowed much from their predecessors and it is not necessary to go into that history here in any detail. Like the earlier act psychologists, their emphasis was on the psychological examination of perception rather than sensation. What distinguished them, however, from all the other psychologists of their day was their utter commitment to holism. They staunchly resisted the atomistic reductionism and abstract theorizing which had been used by their fellow psychologists, even to explain Gestaltqualitäten (Helson, 1973).

> Two main directions, before Wertheimer, can be discerned in attempts to account for the form qualities of Mach and von Ehrenfels: (a) reduction of the form quality to parts and relations, with corresponding bifurcation of perception into sensory and nonsensory psychological processes; (b) retreat into philosophical and logical abstractions far removed from experimental validation (p. 77).

It seems reasonable to regard Gestalttheorie as primarily a methodology, at most a theory of perception, rather than as a dramatic shift in the conceptual framework of psychology. This view concurs with Koffka's definition of Gestalt (1931) as

> . . . the attempt to find within the mass of phenomena coherent functional wholes, to treat them as full primary realities and to understand the behavior of these wholes as well as of their parts, from whole rather than from part laws (p. 645).

We therefore do not believe that it is necessary to regard Gestaltism as being in direct opposition to any other "ism", and we consider its methodological rather than theoretical emphasis to be the ultimate reason behind its ready integration into mainstream American psychology.

When we are freed to consider the theoretical aspects of Gestalttheorie apart from the methodological ones its traditionalism becomes

evident. Gestalt holism, i.e. an emphasis on the importance of the structure of experience, is a logical outgrowth of German idealism. The idea that the perceiver contributes to that which is perceived by organizing it is reminiscent of Kant's constituting imagination and Wundt's creative synthesis. In holding to such a position the Gestaltists did not differ substantially from the Romantics who preceded them or from the phenomenologists who were their contemporaries. Where they did differ dramatically was in their rigorously experimental approach to the examination of all structured wholes and, as previously stated, this is a difference of methodology.

Gestalttheorie quickly gained support in early 20th Century Germany and America because many psychologists were discouraged by the slow and limited results of a molecular approach to psychological problems. The Gestaltists' reliance on naive, descriptive introspection in place of the formidable, controlled observations of consciousness attempted by the structuralists is more in accord with what Brett ((1912-1921), 1962) calls the observationalist tradition than the rationalist one. This use of the givens of experience was actually quite compatible, from a methodological point of view, with naive behaviorism. The marriage of the two can be seen in modern cognitive psychology with its dual emphasis on large, unanalyzable units and strict, observationalist methods.

Yamamoto (1965) has called Gestalttheorie positivistic holism, presumably because it combines a genuinely scientific attitude, i.e. the search for objective facts by empirical methods, with a strong resistance to reductionism and quantification. Despite the promise it

held in the beginning, however, Gestalttheorie is not a major research front now. What work is being done under that name [24], despite its apparent emphasis on molar units, seems in many ways to be as controlled and artificial as that which it replaced. [25]

Phenomenology

Edmund Husserl (1859-1938). Phenomenological idealism is a complex philosophy primarily associated with Husserl but with its roots, like Gestalttheorie, in the Act psychology of Franz Brentano. Heider (1973) says that Brentano did not think highly of either Husserl or Meinong, the immediate forefather of Gestalttheorie, and the two systems are certainly very different in many ways, both from Brentano's and from each other (p. 64)

Phenomenology, as originally conceived by Husserl, [26] had the same general goal as logical positivism, i.e. to provide scientists with clear concepts and basic principles from which to work. They also agreed on the importance of presuppositionless inquiry and both recognized that experience is the ultimate source of all knowledge, but at that point the analogy ends. Phenomenology in its wider, and most agreed upon sense, means a purely descriptive science of observable phenomena, i.e. whatever appears in immediate experience. Husserl recognized, however, that this immediate experience does not involve raw sense data, as Hume and the logical positivists would have it, but is, following Kant, necessarily constituted by the mind. Given this, it becomes the task of the phenomenologist to come as close to the things in themselves [27] as possible without either diminishing or embellishing them in the process.

It is much easier to say what phenomenology is not than to say what it is. Historically, it has stood against "isms", i.e. against psychologism, scientism, reductionism of any kind, and presuppositions in general, without which it is hard to see how there can be any isms. This negative stance combined with an exclusive emphasis on methodology means that phenomenology cannot really be categorized conceptually, apart from calling it a form of idealism, because it really has very little theoretical content. To understand it at all we must look at the theory which grounds Husserl's basic methodological technique, the phenomenological epoqué.

Husserl distinguished between two kinds of statements: empirical and non-empirical. Although he referred to phenomenology as an empirical science, meaning that its aim was to understand the world of the senses, he asserted that phenomenological statements must be non-empirical. They must describe the world non-empirically by means of intuition. This was to be done through the use of the phenomenological epoqué, i.e. the bracketing out of the non-essential elements of a phenomenon in order that its essence can be intuited. This procedure is a rational rather than an empirical one but it is not the usual logical approach of abstraction and generalization. Rather, such phenomenological descriptions serve only as examples, but examples in a special sense in that they are assumed to have evidential functions. Husserl argued that through varying examples of a particular phenomenon, what he called "free, imaginative variation", it should be possible to discover which features are accidental to the object in question and which are necessary and invariant, i.e. the essence of the phenomenon.

The reader might well ask at this point why we are discussing phenomenology at all. It would seem, at least in the necessarily limited way that it has been presented here, to have very little to do with modern psychology. The fact is, however, that historians consider it to be a primary influence behind contemporary humanistic psychology which, in turn, has provided the ground for one of the major research fronts in modern creativity theory. We see our task here to be the tracing of the connection between the complex form of idealism Husserl referred to as pure phenomenology and the apparent irrationalism of Maslow's self-actualization theory.

The underlying connection between these two radically different positions can only be recognized when one realizes the double meaning that modern phenomenology has acquired. Like Hume, Husserl preferred to sidestep the question of what the human mind is and to deal only with what it can know. His commitment was to an epistemological position and not an ontological one. But his successors, and even some of his phenomenologically oriented contemporaries, have not always restricted themselves to epistemological issues.

Since ontology is most generally defined as a concern with the essence of things and since Husserlian phenomenology like all idealisms is a form of essentialism, [28] it may seem somewhat artificial to exclude it from the ontological realm. However, one must remember Husserl's emphasis on the empirical and his avoidance of speculative philosophy. While an understanding of the human mind was at the very core of his phenomenology, he always realized that this must necessarily be an indirect understanding to be derived through careful use of

intentionality.

Following Brentano, Husserl believed that the mind could only be known (apprehended) in the act of self-transcendence, of pointing beyond itself, as consciousness of something. He recognized that even when the mind is exclusively concentrating on itself, what he termed reflective consciousness, this objectifying characteristic of consciousness is its only directly knowable quality. Let us consider how this compares to the view of mind that a psychologist necessarily must take.

Psychology is, according to Runes (1967), "The science of the mind, its functions, structure and behavioral effects (p. 258)". Therefore, a psychologist, even the most over-specialized learning theorist, cannot simply concern himself with what man can know. He must always place this within the larger theoretical context of what man is or, more specifically, what the human mind is. The psychologist then, by necessity, is an ontologist. The philosopher, however, can concern himself with purely epistemological questions and this, in the end, [29] is what Husserl did.

Once this difference in emphasis is recognized it is not difficult to see that post-Husserlian phenomenology [30] has developed along two very different lines: (1) phenomenological epistemology (pure phenomenology), and (2) phenomenological ontology.[31] It is the latter which concerns us here because it is the only line which, until very recently, [32] connects humanistic psychology to phenomenology.

It seems fair to say that North American humanistic psychology, which will be discussed in a later chapter, is grounded not so much in

phenomenology as in the idealism from which phenomenology grew. It is ontological in its emphasis on individualism (see footnote 31), i.e. on what man is or potentially is. It is idealist in its emphasis on the constituting nature of man's mind, i.e on the order he is able to impose on the world and himself. But it is not phenomenological because it does not recognize what Merleau-Ponty called the "human dialectic", i.e. that man can only be defined in terms of his relationship to the world. It is through this interaction that man constitutes himself, in effect creating his own "nature" which can never be known, because it does not fully exist, until he is dead.

Notes - Chapter III

1 Our emphasis.

2 Hamilton, E. & Cairns, C. (Eds.) Plato: The collected dialogues, The Ion, 534b. New York: Pantheon, 1964, p. 220.

3 For the classic discussion of the naturalism issue see Spiegelberg, H. Supernaturalism or naturalism: A study in meaning and verifiability. Philosophy of Science, 1951, 18, 339-368. Runes (1967) states that the common criticism of faculty psychology ". . .is its circularity in attempting to explain individual mental processes in terms of a faculty which is merely the hypostatization of these processes (p. 107).

4 Janet expresses Leibniz' position on activity as follows.

> Leibniz presses this thought of the activity of substance so far that he even admits no degree of passivity. According to him, no substance is, properly speaking, passive. Passion in a substance is nothing else than an action considered bound to another action in another substance. Every substance acts only through itself and cannot act upon any other. The monads have no windows through which to receive anything from outside. They do not undergo any action and consequently are never passive. All that takes place in them is the spontaneous development of their own essence (pp. xiv-xv, our emphasis).

5 Edwards ((1967), 1972) dates the German Enlightenment from 1700 to 1780.

6 For a thorough examination of Coleridge's views on imagination see Lowes (1930). William Blake (1757-1827) held a somewhat similar theory of imagination. However, the difficulties of his mystical style prevented him from exerting the influence on his contemporaries that he otherwise might have.

7 Kant's Critique of Pure Reason, 1st edition, was published in 1781, almost 40 years before the appearance of Coleridge's Biographia Literaria. But, as Brett ((1912-1921), 1962) points out, "The work of Kant belongs, in respect of time, to the last quarter of the eighteenth century; in significance and effect it belongs to the nineteenth century and the twentieth (p. 535)".

8 Locke ((1690), 1928), in the section of his Essay entitled "Of power", describes faculties as follows.

> 6. Faculties. - These powers of the mind, viz., of perceiving and of preferring,. . . are two faculties of the mind; a word proper enough, if it be used, as all words should be, so as not to breed any confusion in men's thoughts by being supposed (as I suspect it has been) to stand for some real beings in the soul, that performed those actions of understanding and volition (p. 139).

9 Kant used the term, anthropology, in the sense of a study of natural history and considered psychology to be a sub-category of it since it is concerned with a study of the natural history of inner phenomena.

10 Edwards ((1967), 1972) says "The contrasting and, in places, overlapping roles of understanding and imagination are among the most puzzling features of Kant's exposition (V. 4, p. 312).

11 This was how Coleridge understood Kant and that was why he could identify so extensively with his theory of imagination.

12 Husserl refers to it as the transcendental ego, and Martin Heidegger developed his transcendental phenomenology by focusing on Kant as an ontologist.

13 Some of the notable psychologists who studied under Wundt and did research in his laboratory were: Kraepelin, Lehmann, Kulpe, Titchener, Spearman, G. S. Hall, Angell and Warren.

14 Edwards ((1967), 1972) says "In both philosophy and psychology Wundt's oscillation between idealistic and positivistic tendencies kept him bound to his time and caused a notable lack of consistency (V. 8, p. 350)".

15 The concept of apperception, in contra-distinction to perception, is a very old one (Edwards (1967), 1972)

> Aristotle, the Church Fathers, and the Scholastics all distinguished between vague notions and feelings on the one hand, and conceptions brought about by an act of intellectual willing on the other (V. 1., p. 139).

The actual term, however, appears first in Descartes who used the verb, apercevoir, to stress the volitional element in the cognitive process. But it was in the next generation of philosophers, i.e. Locke and Leibniz, that the term came to connote self-reflection rather than awareness, to whatever degree, of the changing external world. (This distinction was later to be elaborated upon by Husserl as the reflective vs. the pre-reflective consciousness),

Kant made a further distinction between empirical apperception, i.e. self-awareness which depends upon the changing conditions of consciousness, and transcendental apperception, i.e. the inner, unchangeable unity of consciousness. For Kant, the ideas of space and time and the categories, are not objects of perception but modes of perceiving. Therefore, our conscious reasoning about the world can never simply be a reflection of the world as it really is, and innate ideas becomes a necessary concept to explain the level of our awareness.

The German Idealists took Kant's notion of the constituting imagination even further. In Schelling, who was a significant influence on Wundt, apperception is but a phase in the evolution of consciousness which wills itself from a pre-rational, groping state towards the discovery of the universal laws which govern it. Like Schelling, Wundt was very interested in interpreting prerational or mythical thinking on the assumption that myth is not untruth but

pretruth.

Two German psychologists who preceded Wundt, J. F. Herbart (1776-1841) and F. E. Beneke (1798-1854), interpreted apperception much more empirically than their Romantic contemporaries, Hegel, Schelling, and Schleiermacher. They are cited by Warren (1921) as being proponents of associationism in a strange sort of way (p. 205). That is to say, they were opposed to Kant's a priori treatment of mind and to faculty psychology in general, and both sought to explain consciousness as the interaction of mental data rather than as the synthesizing activity of mental powers or faculties, as the idealists did. However, they differ from other associationists very significantly. Herbart emphasizes the antagonism of mental data rather than their association and Beneke considers association to be little more than a question of the mental data following the line of least resistance. Herbart, a student of Kant and his successor at Konigsberg, emphasized the dynamic element of apperception and saw it as the source of man's power of reflection. In describing Herbart's position, Edwards ((1967), 1972) says

> It is the function of apperception to assimilate the various and often divergent ideas. In this process the older apperceptive mass, consisting of concepts, judgments, and maxims, will tend to assimilate more recent and settled impressions. No one, however, can measure how strong the older apperceptive mass must be in order to fulfil effectively the function of assimilation (V. 1, p. 139).

16 According to Brett ((1912-1921), 1962), the combined position of McDougall and Tolman can be summarized as follows, and originates from McDougall's An introduction to social psychology (1908):

> (a) All behavior is purposive
> (b) There are certain innate goal-seeking tendencies (This is the 'instinct' hypothesis.)
> (c) All behavior is motivated by instincts either directly or indirectly through the formation of 'sentiments' and 'tastes'. (This is the 'instinct reduction' hypothesis.) (p. 703).

Tolman's attempts to operationalize purposiveness led him to postulate the intervening variable, which plays an important role in modern cognitive theory.

17 This claim may not be entirely fair. In at least one article, Titchener compares Brentano with Wundt and concludes that it is Brentano who is the traditionalist and Wundt who is the innovater. This suggests an awareness and appreciation of Wundt's speculative views (See Titchener, E. Brentano and Wundt: Empirical and experimental psychology. Amer. J. Psych., 32, 1921, 108-120).

For an interesting discussion about the apparent shift in Titchener's thought during his later years, away from introspection and any attempt to devise a complete system of psychology and towards the possibility of employing the phenomenological method in his research, see Evans, R. E. B. Titchener and his lost system. In Henle, Jaynes, & Sullivan (1973).

18 This was based on his discovery that motion can be simulated by the appearance in quick succession of two spatially separated stimuli, eg. the flashing of two lights. From this he concluded that the perception of pure movement is an experience which is not analyzable.

19 For a discussion of Herbart's anticipation of Gestalttheorie see Heider, F. Gestalt theory: Early history and reminiscences. In Henle, Jaynes & Sullivan (1973).

20 Psychologie vom empirischen Standpunkt. Brentano was German and he lectured at Würzburg before going to Vienna. Act psychology is called the Austrian school because it took root at the universities of Vienna, Graz and Prague (then under Austrian control). He was a major influence on the Gestalt school, phenomenology, and also on the Würzburg school of imageless thought. He is credited with drawing its founder, Oswald Külpe (1862-1915) away from Wundt's content psychology and closer to act psychology.

21 Wundt felt that there were three basic problems to be dealt with in experimental psychology: (1) the analysis of conscious processes into elements, (2) the discovery of how these elements are connected, and (3) the determination of the laws of connection (Marx & Hillix, 1963, p. 63).

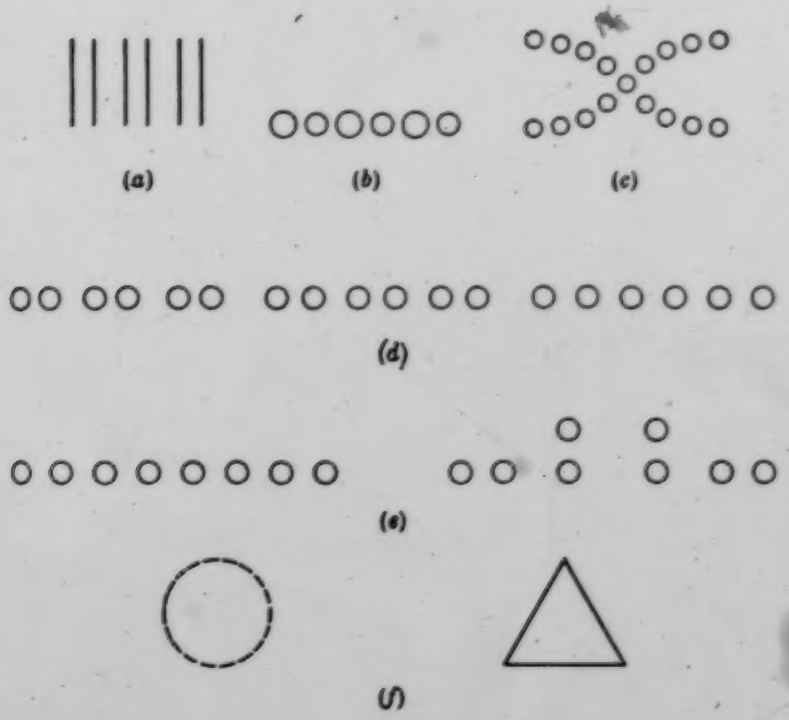
22 Wundt was influenced by J.S. Mill and, like him, distinguished between simultaneous and successive associations. He questioned whether the former should be called associations at all because he thought they were much tighter than the latter and he called them fusions. He considered them to be greater than the sum of their parts, i.e. his principle of creative synthesis. Wundt's Grundzuge der physiologischen psychologie is referred to as "his classical mental chemistry (p. 400)" by Herrnstein & Boring (1965).

23 Already in 1890, the philosopher, Christian von Ehrenfels, had published an important paper on Gestalttheorie, Uber Gestaltqualitaten, based on the physicist, Mach's concepts of space form and time form as existing independently of their elements. By the time Wertheimer first published on the phi phenomenon in 1912, three psychologists at Muller's laboratory in Gottingen were already publishing related phenomenological investigations on perception. They were Erich Jaensch (1883-1940), David Katz (1884-1957) and Edgar Rubin (1886-1951). In fact, it was the Dane, Rubin, who developed the famous phenomenological distinction between figure and ground which he first published on in 1915.

24 See, for example, Norman Maier's Problem solving and creativity in individuals and groups. Belmont: Brooke/Cole, 1970.

25 The more recent, specific contributions of Gestalttheorie to creativity theory will be considered under mainstream creativity theory at a later point in the thesis.

For an illustration of some of the early Gestalt theorists' important insights on perception see the chart on the following page.



(*a*) *Proximity:* Elements close together in time or space tend to be perceived together. For example, the lines in Figure 2*a* tend to be seen as three pairs of lines rather than in some other way.

(*b*) *Similarity:* Like elements tend to be seen together in the same structure, other things equal, as in Figure 2*b*.

(*c*) *Direction:* We tend to see figures in such a way that the direction continues smoothly. This factor is illustrated in Figure 2*c*.

(*d*) *Objective set:* If one sees a certain type of organization, one continues to do so even though the stimulus factors that led to the original perception are now absent. Consider the series shown in Figure 2*d*. As the dots are looked at progressively from left to right, one tends to continue to see the pairs of dots as on the left, even though on the right the proximity factor no longer favors this organization.

(*e*) *Common fate:* Elements shifted in a similar manner from a larger group tend themselves to be grouped, as in Figure 2*e*.

(*f*) *Prägnanz:* Figures are seen in as "good" a way as is possible under the stimulus conditions. The good figure is a stable one. For example, as shown in Figure 2*f*, gaps in a figure are frequently closed because the resulting figure is more "pregnant" (subprinciple of closure). A good figure is one which cannot be made simpler or more orderly by a perceptual shift.

Figure 1

Perceptual factors in Gestalt psychology. (Marx & Hillix, 1963, p. 186)

26 The original members of what we might call the school of phenomenology were scattered among several German universities before World War I. They conceived of phenomenology in many different ways, the differences only gradually becoming evident as Husserl elaborated more and more upon his basic theory. The existentialists, Sartre and Heidegger have also used the term, phenomenology, in ways which would not have been acceptable to Husserl.

27 Zu den Sachen!,(to the things in themselves!) was their motto.

28 Runes (1967) contrasts idealism to materialism as follows.

> Materialism emphasizes the spatial, pictorial, corporeal, sensuous, non-valuational, factual, and mechanistic. Idealism stresses the supra or nonspacial, nonpictorial, incorporeal, suprasensuous, normative or valuational, and teleological (p. 136).

29 In his later works, Husserl consistently attacked psychologism (the identification of logical with psychological statements), including his own early Philosophie der Arithmetic (1891), which was a psychologistic account of arithmetic.

30 According to Runes (1967), the term, phenomenology, goes back at least as far as Lambert (Neue Organon, 1764), who used it to refer to the theory of appearances fundamental to all empirical knowledge. Kant, Hegel, Hamilton, and other 18th and 19th century philosophers all made use of the term in slightly differing ways. Self-styled American phenomenological psychologists seem to have been using the term in a more general sense than Husserl used it

31. Apart from psychology this use of phenomenology is seen most clearly in the existential philosophers. The sub-title of Jean-Paul Sartre's major work, Being and Nothingness, is An essay on phenomenological ontology. Martin Heidegger dedicated his Sein und Zeit (1926) to "Edmund Husserl in friendship and admiration". In this work he states that "Phenomenology is our way of access to what is to be the theme of ontology, and it is our way of giving it demonstrative precision. Only as phenomenology, is ontology possible (Being and time, 1962, p. 60).

32 There is an important difference between American humanistic psychology and modern European phenomenological humanism. It was clearly drawn in a paper by Carl Graumann, director of the Institute of Psychology at the University of Heidelberg, presented to the 4th Banff Conference on Theoretical Psychology (Conceptual Issues in Humanistic Psychology) in October of 1975 at the University of Alberta.

Graumann, one of the chief proponents of a more rigorously phenomenological approach to humanistic psychology, suggested that one of the chief differences between American and European humanistic psychology is that the former remains much more closely related to classical humanism, i.e. to the discovery of man as an individual, than the latter.

Jacob Burckhardt, in his authoritative history, The civilization of the renaissance in Italy ((1860), 1961), traces this "discovery" of individualism to 14th century Italy. He states that while the rest of Europe was still predominantly feudalistic the Italian city-states emerged, ruled by a series of despots who gather around themselves men they considered useful or worthy of protection. It was because of this peculiar political situation, Burckhardt argues, that individuality arose.

> These people were forced to know all the inward resources of their own nature, the momentary as well as the permanent; and their enjoyment of life was enhanced and concentrated by the desire to obtain the greatest satisfaction from a period of power and influence that might be very brief (p. 122).

Graumann contrasts classical humanism to socialist and critical humanism, i.e. existentialism. Both socialist and classical humanism adhere to an essentialism, an ability to define man in terms of essential characteristics. However, the former recognizes that

> . . . to appeal to the freedom, the dignity, the worth, the creativity of the individual, to refer to the equality of rights and chances for all, to understanding and peace between groups, classes, and nations, is a deceptive attribution to individuals of characteristics which an inhuman society and its infrastructures do not and cannot permit (p. 9).

The chief flaw of classical humanism, and by extension American humanism, according to Graumann, is that it does not recognize this. In direct reference to third force psychology Graumann asks "Do we live in a society in which the ambition to help people 'to grow and evolve more fully in realization of their potential (Bugental, 1967, p. 8)' is a sincere aspiration?"

Graumann contrasts these forms of essentialism "which understand man as determined, be it by internal or external structures (p. 10)" with "the radical dialectic of the internal and external (which) 'condemns' man to be free (Sartre) (p. 10)" and he goes on to say that

> In this perspective it would be wrong to speak of human 'nature' or 'essence'; the adequate concept is 'human condition' (p. 10).

Later in this paper, Graumann traces the origins of the humanistic movement in North America to the late Ganzheitspsychologie and points out the results in Germany of adopting two of its basic tenets: holism and irrationalism. He emphasizes the dangers of idealizing humanity, common to both third force and classical humanism.

> There is a special interest in the vigorous, the healthy, the mature, the autonomous, the self-actualizing, the unique (as the 'more fully-human') individual (Maslow) (pp. 13-14).

He goes on to point out that

> The danger is that in our time such humanism turns inhuman insofar as the majority of 'less evolved' people is treated as 'less human' because their situation, by which I mean

> their economic, social, ethnic circumstances, never gives them a chance to evolve those 'human capacities and potentialities' which are the major concern of humanistic psychology (cf. Braginsky & Braginsky 1974) (p. 14).

Graumann concludes his discussion of what he sees to be wrong with American humanistic psychology by saying

> Yet 'human nature' - and this I think is the core of the conceptual confusion of 'humanistic psychology' - does not reside in the interior of an individualistically conceived personality, ready to be 'actualized' or 'evolved' in encounters with humanists, but must be looked for in the dialectical interactions between men and their concrete social environments (p. 15).

PART II

An examination of three recent models

of psychological research in creativity

> We have found that each approach to creativity has its own assumptions and that these determine to a great extent what the cogent issues are. Each approach tends to examine questions, to test hypotheses, and to use methodologies judged peripheral by the other approaches. The evidence available from experimental studies is seldom discriminative, supporting a single theory while refuting competitive orientations at the same time. Thus, little confrontation between the major theoretical systems does take place today.
>
> . . . .
>
> Contemporary approaches to creativity are essentially inchoate minitheories. However, their indispensability to science will no doubt rest on the fact that, in Hebb's words, 'good theory leads to its own destruction by making better theory possible' (pp. 21-22).
>
> (Bloomberg, 1973)

Introduction to Part II

In this section we will be discussing the work of three major creativity theorists. Certain aspects of this research will be considered in painstaking detail while others are not dealt with at all. We have, however, a purpose for proceeding in this way.

We recognize that theory and method work together in model building. It is our belief, however, that if we look at some of the step by step reasoning that has gone into forming even some of the minor assumptions upon which these models rest we will get a good idea of the ways in which distortions can enter into the development of a theory. And, as Bloomberg has observed, the superstructures, i.e. the models in their entirety, cannot be compared because their conceptual bases are very different. To put it succinctly, then, we will be doing an historical rather than a thematic analysis because we think that is the more appropriate technique in this situation.

By pointing out some of the little distortions that go into model building, and which in the end produce some very different results, we hope to demonstrate that it is inappropriate to force concepts, like creativity, to fit into theories by operationalizing, and hence reducing, them. We believe it would be better to remain open to altering the theory or model at every step of the way in order to allow for its best possible fit with the concept or concepts being researched.

CHAPTER IV

Joy Guilford's Structure-of-Intellect Model

In terms of sheer volume, the work of Joy Guilford and his associates that is relevant to creativity will probably never be equalled by any other research group. However, his main research goal throughout his entire career as a psychologist has been the development of a conceptually solid and empirically valid mental abilities model, and his interest in divergent thinking has been but a small part of this.

The structure-of-intellect model was conceived of and partly developed during the period from 1939 to 1949 when Guilford was employed by the American Army Air Forces Aviation Psychology Research Program as Director of Research in Intellectual Aptitudes. His research subjects were air force personnel, his research area was individual differences and the research method he used was multivariate analysis.

A trait approach emphasizing the study of individual differences has guided most empirical research in creativity (Nicholls, 1972). This is why so much effort has been expended in the last quarter century to demonstrate a significant degree of independence of creativity from IQ. As Feldman (1974) says

> Creative traits, by definition, had to be considered to differ from 'intelligence' traits to give them some potential for predicting behavior better than IQ (p. 48).

In choosing a factor analytic approach to the correlation of traits Guilford was assuming that if he divided the intellect up into enough categories and substantiated their existence through a factor analysis of all the possible correlations he would end up with a complete model of human cognition. In the structure-of-intellect cube there are 120 possible categories, which Guilford calls cells, and over the past 30 years most of these cells have been researched by Guilford and his associates.

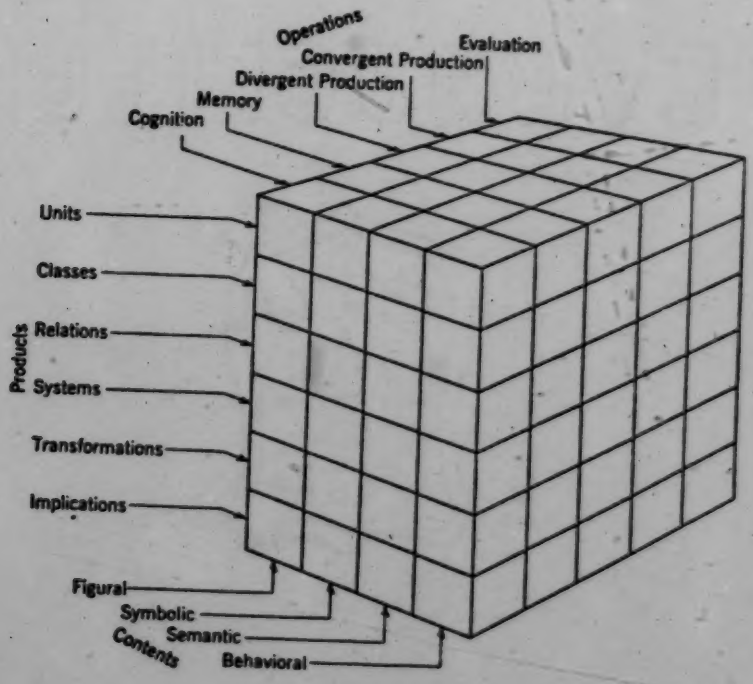


Figure 2

Guilford's Structure-of-intellect Model

Guilford has hypothesized that divergent production, which, within the context of his model, functions to generate new information from known and remembered information, accounts for most creativity. He has defined the major distinguishing characteristics of divergent thinking ability as fluency, flexibility and originality. His creativity tests are based largely on interactions between divergent production and the other two dimensions of his model, contents and products. However, he does not believe that divergent production can occur independently of convergent production [1], holding, like most mainstream creativity theorists, to the intelligence threshold theory (see Getzels and Jackson, 1962; Yamamoto, 1964; McClelland, 1958; Anderson, 1962). That is, he believes that creativity cannot occur in persons whose IQ is much below 120 (Guilford, 1956). He has also stated (Guilford, 1975) that ". . . retrieval of information (recall) from memory storage. . . is at the heart of creative thinking (p. 58).

Underlying Guilford's entire structure-of-intellect model is his belief in the multiplicity and continuity (and therefore scalability) of intellectual traits, including creativity traits. This is indicated by Guilford's references to the basi orientation of his Aptitudes Research Project at the University of Southern California, which he has directed since 1949 (Guilford, 1967c).

> Rejecting the prevailing doctrine that intelligence is a single, monolithic ability, [2] and also the view that creative talents are something outside the realm of intelligence, [3] the studies began with the assumption that there are several, perhaps many, distinguishable abilities involved. It was also assumed that creative talents are not confined to a favored few individuals, but are probably widely distributed to different degrees

> throughout the population. Creative talents could therefore be investigated without being restricted to observation of the gifted few (p. 7).

It is the particular factor analytic approach that Guilford has used, however, which has caused the greatest reaction from his critics. Guilford has been heavily criticized by several psychologists interested in creativity research for his use of the orthogonal rather than the oblique method of rotating axes in factor analysis.[4] It has been suggested that his factoring methods obscure the high cross-correlations between many divergent and convergent production measures and the low inter-correlations between divergent measures (Cropley, 1966) and also that they offend the law of parsimony (Vernon, 1964). If second-order factors were revealed, the large number of primary factors in Guilford's Structure-of-intellect (SI) model could be significantly reduced.

Guilford argues for the appropriateness of his method of rotation for several reasons. Higher order factors, he says, obscure what may be valuable information at the primary level (1975). A more serious problem, as he sees it, is the dependency of oblique solutions upon the population of tests that are factor analyzed, tests that are, at the present time, inadequate in several ways. For example, two factors may be commonly loaded and oblique rotation will give the appearance of inter-correlation where there is none (Guilford, 1956).

Having been so persistently criticized through the years for his factoring methods, Guilford has recently softened his theoretical position a little (1975).

> Having rejected the use of an over-all creativity score, I now retreat a little in saying that there may be some

> meaningful composite scores, short of an all-inclusive one. Although my associates and I in research have always rotated axes in factor analysis orthogonally, we did not necessarily believe that all the SI abilities are mutually independent. We didn't have faith in any of the methods of oblique rotation, which are in common use, to find correlations between first-order divergent-production factors and abilities (p.50).

Such a retreat will no longer satisfy his more thoughtful critics, however, for they have gone beyond attacking his factoring techniques and now question the basic theoretical position underlying his entire SI model. They question whether any abilities, including creative thinking abilities, are unique and separable. Vernon maintains that there is considerable overlapping between categories and that splitting up factors by using more and more detailed tests does not necessarily imply the existence of corresponding distinct abilities (Vernon, 1964). Thorndike (1966) asks whether any ability outside that indicated by traditional IQ tests is really necessary to account for creative talent. Guilford's response has been that convergent and divergent abilities ". . . have been differentiated, most of them several times over, by the much more sophisticated operation of factor analysis (1971, p. 78)." But, as Butcher (1975) points out,

> Factor analysis by itself is unable to indicate one best picture of the structure of abilities. A choice among alternative pictures must be made on psychological rather than statistical grounds (p. 66).

In Guilford's model we see an example of the circularity which can be involved in psychology between theory and method. He has used factor analytic techniques to fragment the intelligence monolith, but he has refrained from using them to search out a possible uniformity which may yet exist at a deeper level. Yet his concept of transforma-

tions [5] points towards such a unity. Guilford (1970b) observes that while 16 out of 20 abilities involved in transformations are outside the divergent production columns they provide an important basis for intellectual flexibility and therefore for divergent thinking. He also considers evaluation and memory to be important for creative thinking (Guilford, 1973c (p. 170).

The whole question of the inter-relationship of factors in Guilford's model becomes less significant when seen in terms of the over-all orientation of his model. The structure-of-intellect is just that for Guilford, an intricate dissection of human intelligence. The abilities that contribute to creativity, as that term is commonly understood, are just one part of this intelligence. And to function effectively they require substantial input from many of the other parts, convergent thinking abilities, memory and evaluation - in other words, most of what is taken to represent intelligence in conventional IQ tests. In terms of Guilford's model, then, divergent thinking ability can be seen to be a necessary but not a sufficient condition for creativity, even at the pure abilities level. In this context, the statistical techniques Guilford uses to emphasize inter-correlations of divergent thinking factors and to de-emphasize cross-correlations with convergent thinking factors can be taken as an attempt to clarify the relationships of the former but not as a deliberate denial of their relationships with the latter.

Viewing in retrospect the gradual unfolding of Guilford's model from 1950 to the present time, we are left with a definite sense of contradiction between his conceptualization of creativity and his operationalization of it. On the one hand we can conclude that he is,

in an obvious sense, a creativity theorist and that his SI model functions largely as a mechanism for revealing the intricate interweaving of creativity factors with each other and with general intelligence factors. On the other hand we could say that, while Guilford has continued to talk about creativity at the conceptual level, at the functional level he has operationalized it away.

Guilford's conceptual writings on creativity often reveal an openness to and familiarity with alternative creativity theories. [6] Yet his research reports indicate that very little attempt has been made by him and by other SI researchers to actually integrate this material into his model. While we recognize that prescientific speculation can have no place in a mathematical model, from this it does not follow that such speculation is untrue. Discarding potentially relevant material because it cannot be operationalized in terms suited to a particular model seems to be in some sense a reversal of the scientific method. The implication is that in order for the method to work the theory must be adjusted to the method. We believe there have been several examples of this in the development of the SI model.

In his first paper on creativity, Guilford (1950) suggested that this problem cannot be handled by the psychologist outside the context of the creative personality. He also suggests the appropriateness of a "factorial conception of personality (p. 444)" through which it would be possible to ". . . determine the threads of consistency that run throughout the categories describing abilities, interests and temperament variables (p. 447)." Guilford acknowledges that intercorrelation procedures are necessary since thousands of observable traits have emerged and concludes that a theory of creativity must be

". . . a theory of the entire personality including intelligence (p. 447)".

The philosophical and scientific positions that Guilford takes in this paper seem now, as then, to be very reasonable ones. On the one hand he radically reshaped the prevailing, vague concept of creativity into an empirical construct by defining it as a continuous variable and as a special ability which could be tested and measured like other abilities.[7] On the other hand, he acknowledged its very great complexity, commenting on how creativity pervades the entire personality. However, this early concern with the inter-relationship of intellectual, motivational and temperamental traits in the creative act has not been emphasized by Guilford at all in his subsequent model building. We take this to be due to the fact that his basic ideas on intellectual abilities, under which category he subsumed creativity, were already formed by the time Guilford gave this paper in 1950.

As mentioned earlier, Guilford's SI model was in the process of development for several years before his 1950 article on creativity was published. It was derived through multivariate analysis and was based on a rejection of the "g" concept of intelligence. Therefore, we can conclude that however tentative, searching, open and reasonable Guilford's position may appear in that 1950 paper it was very firmly grounded in a previously established theory and method.[8] When this fact is kept in mind certain suggestions of his such as the need for a factorial conception of personality appear less like reasonable hypotheses and more like post factum rationalizations.

Because his divergent thinking tests are concerned only with the

measurement of creative thinking potential,[9] Guilford has not needed to concern himself, in his model building, with personality although he has acknowledged (1950) that it is closely related to the actualization of creativity.

> Whether or not the individual who has the requisite abilities will actually produce results of a creative nature will depend upon his motivational and temperamental traits (p. 444).

However, Wallach and Kogan (1965) have suggested that personality and motivation affect creativity test scores as well as actual creative performance. They tested elementary school students for creative potential, using Divergent-production (DP)-like items but without the restrictions of a testing atmosphere in the hope of controlling for a confusion of glibness with creative fluency and for the differential effects of anxiety (Easterbrook, 1959) on creativity. Their results suggested that personality influences can not be eliminated from the test situation easily, if at all. If this is the case then it is not possible to test potential creative ability without taking temperament into account and that would have significant implications for Guilford's model.

Guilford (1971) has rejected Wallach's and Kogan's work on several grounds. He points out that they have not established the construct validity of their creativity scores and finds them to be in a state of self-contradiction because the tests they developed to measure creativity were composed of DP types of items even though they had argued that the customary DP tests do not represent creative talent. He also argues that time limits are needed as one way of controlling conditions in a good psychological experiment, one reason being that

liberal time will be used by some E's ". . . to invent strategies [10] that may unduly facilitate their performance. These special advantages may change the character of the test and the variable or variables that it measures (p. 79)". [11]

Guilford also argues that tests may measure different things at different points during E's working period. Christenson & Guilford (1963) found associational fluency to have much higher scores during earlier than later minutes of the test. Guilford (1971) concludes that

> One should go slow in changing the nature of tests lest their construct validities should be markedly altered (p. 80).

As for the positive gains that Wallach and Kogan had hoped for in devising this experiment, Guilford argues that a test is a test even when called a game and he observes that Grade five children are not so easily deceived. He points out, also, that individual testing may well be more stressful than group testing because of the relative anonymity of the former.

The ultimate reason that Guilford can dismiss these and any other criticisms of his position is because for him his model has become the reality it was supposed to symbolize. He warns psychologists (Guilford, 1971) against taking any non-Guilford test of creativity too seriously ". . . even though it seems to fit a plausible theory concerning that concept (p. 83)", stating that

> unless the test is logically or empirically shown to have a positive relation to one of the divergent-production or transformation abilities of the SI model. . . its status as a special contributor to creative talent is to be questioned. The best kind of empirical check is to factor analyze the test with appropriate controls (p. 83).

Such a remark indicates that Guilford is so convinced of the validity of his constructs of divergent production and transformation that he automatically assesses other research on creativity in terms of them. [12]

An indication of the reality of factor-concepts for Guilford is given in the following (Guilford, 1967a) remarks

> One of the chief advantages of interpreted factor concepts is that they are tied to observable information - the tests that represent them. They are therefore in the category of empirical concepts; their definitions are referential.
>
> . . . .
>
> The conceived psychological factor derives its properties inferentially from the basic psychological nature of the task involved in the tests (p. 423).

To suggest that man-made tests specifically designed to validate the theory in question can be referred to as observable information seems to us to be a semantic distortion based on the ambiguity of the term, observable.

Guilford has referred specifically to the criterion problem in factor analysis in the following way (1964).

> . . . our way of using factor analysis has one great advantage in that we do not have to worry about the criterion problem. Factor analysis provides its own criteria (p. 262).

Such remarks suggest that Guilford has substituted the criterion of internal consistency for that of external validity [13] which implies that some of his methods are more appropriate to a logico-deductive system than to an inductive scientific one. Yamamoto (1965) has recorded the objections to this approach by such psychologists as McNemar, Beittell and Cronbach. While Guilford's statistical methods merely reflect the biases of all correlational psychologists with their strong emphasis on individual differences, one could perhaps say

that Guilford has done it bigger and better than most. The self-sufficieny of his system is awesome and its impact cannot be denied, but, as McNemar has argued (Yamamoto, 1965), it can only be properly validated through independent criteria.

The ultimate, although indirect, criticism of Guilford's factor analytic model comes from another factor analyst, Sir Cyril Burt (as cited by Butcher, 1975).

> Burt's view of factors as convenient principles of classification rather than as 'real', causal entities is the only scientific one except when other lines of evidence besides the correlational and factor-analytical one converge to support something beyond a mere statistical unity (p. 63).

In his conceptual works Guilford, himself, has often made this point which only serves to emphasize the gap between Guilford, the theorist, and Guilford, the research scientist. For example, in the preface to his book, Personality (1959b), he states that

> The unifying basis of theory comes from a wedding of the logic of experimental method and factor analysis. The latter, if it is to be used effectively in basic research, should never be separated from the former (p. vii).

Guilford has taken considerable effort through the years to present himself as open-minded and reasonable. Yet, as we have tried to demonstrate, his research reveals a definite bias towards the uncritical acceptance of his factor analytic findings and towards a belief in the reality of his model. But to what extent can a model abstract itself from life and still be considered to have any reference to reality? By limiting himself to an examination of the abilities component of creativity Guilford has been able to make some significant contributions to the area. But the question is, at what point does the

arbitrariness of such a limitation do more to distort than to clarify the issue under consideration. Finally, Brandt (1975) has asked if a scientist involved in an ongoing and sometimes lifetime commitment to a research project can hope to distance himself from it sufficiently to see its limitations and distortions? The answer, he suggests, is No. [14]

Notes - Chapter IV

1 Guilford (1967d) states that

> Relations between divergent-production-test scores and IQs are generally quite low, but it appears that although a high IQ is not sufficient for doing well in DP tests, being above average in IQ is almost necessary (170).

2 See Shouksmith (1970, pp. 11-12) for a discussion of the continuing prevalence of the G concept, which he attributes to Spearman's influence.

3 Albert (1969) indicates that a statistically significant shift from genius to creativity had already occurred by 1940.

4 When axes are totated obliquely they meet at acute angles and the factors involved will be correlated, allowing second and even third order factors to be extracted. In orthogonal rotation the axes meet at right angles and the factors are said to be uncorrelated.

5 Guilford (1967d) states that

> Transformations are changes of various kinds, of existing or known information in its attributes, meaning, role, or use. The most common transformations in figural information include changes in sensory qualities and quantities, in location (movement), and in arrangement of parts. Variations on a theme would be a case in music. In symbolic information, the best examples may be found in mathematics, as in factoring expressions or in solving equations. With semantic information, changes in meaning, significance or use are found. In behavioral information, changes in interpretation or in mood or attitude would be examples (p. 100).

6 Guilford (1967d), for example, describes units in Gestalt terms.

> Units are relatively segregated or circumscribed items of information having 'thing' character, perhaps equivalent to the gestalt 'figure on a ground'.. The gestalt concept of 'closure' describes very well the process by which units are set off from other information (pp. 71-72).

7 Guilford (1950) states that

> The important consideration here is the concept of continuity. Whatever the nature of creative talent may be, those persons who are recognized as creative merely have more of what all of us have. It is this principle of continuity that makes possible the investigation of creativity in people who are not necessarily distinguished.

. . . .

> The general psychological conviction seems to be that all individuals possess to some degree all abilities, except for the occurrence of pathologies. Creative acts can therefore be expected, no matter how feeble or how infrequent, of almost all individuals (pp. 445-446).

8 Guilford was not the first to define creativity as an intellectual ability. Simpson (1922) first isolated the creativity factors of fluency, flexibility and originality later adopted by Guilford. He also devised a creativity quotient against which individuals could be assessed so he must have assumed that creativity is a continuous trait.

Guilford (1956) acknowledges his use of intellectual constructs developed by his predecessors, Thorndike, Thurstone and Hall, to explain divergent thinking. Spearman (1930) is also acknowledged as a psychologist who defined creativity as one or more special abilities.

9 Vernon (1972a) has pointed out that

> . . . MacKinnon has tested large numbers of scientists, writers, architects, and other people nominated by their peers as outstandingly creative and has found that they scored no better on similar tests than relatively non-creative people in the same professions. Conceivably, mature adults do not react kindly to the rather trivial kinds of materials that make up most divergent thinking tests; and I would suggest that more progress might be made at this level of creativity by devising more specialized instruments which reflect the widely varying interests of different kinds of artists or researchers in different fields of science and technology (p. 34).

10 Dr. Steve Hunka (University of Alberta, private communication) points out that the invention of strategies is itself a creative process.

11 Vernon (1972a) states

> I have found that it is possible to give (divergent thinking tests) in group form, but in a relatively permissive, encouraging manner, with minimal emphasis on timing or evaluation, and that this improves productivity and validity (p. 31).

12 Guilford (1950) compares factor analytic and experimental designs concluding that they have many parallel properties, the only great difference between them being in the matter of verification of results, a statistical test of significance of the measured result being not possible in the former case where confidence must depend upon the "...compellingness of the factor structure and the repeated verification of a result (p. 450)". He goes from this position in 1950, i.e. that this is all that is possible for factor analysis,

> to the position quoted (1971) that this is all that is necessary, with no apparent intervening step in his reasoning.

13 Guilford (1973c) suggests that

> The construct validity of our tests of originality was well demonstrated by a study reported by Barron (1955) (p. 183).

While Barron ((1955), 1973) does find high interrelations between Guilford originality measures and certain other originality measures such as the Rorschach O+ and the TAT originality he observes that

> . . . it is quite possible that originality is simply a multi-factorial dimension in which certain factors bear little relationship to other factors but yet are positively related to the underlying dimensions as a whole. . . (p. 279).

14 The rapidly decreasing number of references to the SI model cited in Psychological Abstracts in recent years suggests that the limitations of his model have been recognized by other psychologists if not by Guilford, himself.

CHAPTER V

Cattell's Factor Analysis of the Creative Personality

Cattell's interest in creativity is long-standing. In 1937 he was already writing about the factors which distinguish researchers from the general population. However, analyzing creativity is only a small part of a much larger goal for Cattell, the examination of intellectual, personality and motivational traits and their inter-relationships within the context of a factor analytic model. It is his students and research associates, especially H. J. Butcher and J. E. Drevdahl, who have done most of the creativity research based on Cattell's model in recent years, sometimes as co-authors with Cattell and sometimes alone. With this qualification in mind it still seems appropriate to consider Cattell as a major contributor to the literature since the basic idea and the initial work of contrasting large groups of proven creatives to the general population in terms of their respective norms on the 16 PF (1954) and the major hypotheses concerning the differences thus found were Cattell's.

One of Cattell's major contributions to psychological research is his distinction between fluid and crystallized intelligence offered first at a meeting of the A. P. A. in 1941. It was out of his conception of fluid intelligence that the IPAT (1940) developed, an early culture-

fair test which has been revised several times (1965) and is still in use. The other major research finding based on this distinction was Cattell's realization that fluid intelligence would be a much more potent indicator of creativity than crystallized intelligence.

Cattell's distinction between fluid (g_f) and crystallized (g_c) intelligence is factor analytically derived and cannot, he says (1971), be reduced to any of the existing intelligence dichotomies (pp. 55, 100). Pawlik (1966) can be consulted for a summary of the history of this research and an explanation of the factorial differences which underlie it. Here we need only note that g_c loads typically verbal ability, reasoning, the number primary and, to a lesser extent, word fluency. It therefore relates quite closely to conventional intelligence. By contrast, g_f loads mainly on the perceptual, culture-fair tests: series, matrices, topology and classifications (1971, p. 95). Crystallized ability operates in areas where previous learning has taken place while fluid ability (Cattell, 1971)

> . . . is an expression of the level of complexity of relationships which an individual can perceive and act upon when he does not have recourse to answers to such complex issues already stored in memory (p. 99).

While Guilford factor analyzed the intellectual correlates of creativity, Cattell's major contribution to the literature has been a multivariate analysis of personality correlates. Gowan (1972) has observed that

> . . . of all those who have looked at creativity from a rational, problem-solving point of view, certainly the most impressive are the factor analysts. . .(who) from Spearman through Kelley and Thurstone to Cattell and Guilford have discussed the subject with an authority and precision scarcely found elsewhere (p. 8).

But, while the two models share some of the same strengths, they also share some of the same weaknesses generally associated with a multivariate approach to the interpretation of psychological problems.

Since multivariate analysis functions to test the effect of many variables acting simultaneously it allows for a much more sensitive and holistic interpretation of data than what Cattell (1966) has called the "bivariate brass-instrument method (p. 9)". Born and educated in England and with a background in clinical psychology, Cattell has strongly seen the need for such advantages in psychological research. He has argued that multivariate analysis combines the best of both clinical and experimental psychology because it allows for imagination at the level of input, in the preparation of test items, but can be purely objective at the level of output, i.e. in determining the way these items cluster. It even allows for afterthougnts in that new scales can be added to the existing battery on the basis of new hypotheses without affecting the validity of the original work (1959).

Butcher has stated (1975) that the major criticism which can be made of many factor analysts, including Guilford, is their tendency to treat their factors

> Like Platonic 'Forms' or 'Ideas' (which) are more real than the scores from which they are derived, and (whose) structure is constant over changes in the sample of people, in the environmental conditions and in the period of time. Sometimes indeed it may be, but this can never be simply assumed (p. 62). 1

Despite the sophisticated mathematical techniques used in extracting factors the results are, to a large extent, anticipated by the researcher. He undertakes the construction of his model with a

definite psychological theory about which items people will respond to in a systematic way and items that inter-correlate highly in the subsequent analysis of variance are then considered factors. He has distinct reasons as to why he expects particular items to cluster, sometimes based on other research findings and sometimes based on L-data personal observations. Therefore, one could say that a subjective bias is involved in his choice of items in the first place. The second possible source of bias is the matter of rotation of factors, already discussed in the Guilford chapter. Since the choice of rotation methods affects the number of factors which are extracted from the data and determinine whether or not second-order factors are uncovered it is an important one. The choice between using the orthogonal or oblique method of rotation is ultimately a subjective one althougn this subjectivity must presumably be based on a defensible theoretical position.[2]

Cattell (1959; 1966) has shown that he is very cognizant of these and other problems involved with the multivariate approach. But whatever the limitations of factor analysis may be it has become a primary research technique for handling complex psychological problems, such as the analysis of human personality, which involve the interaction of a large number of uncontrolled variables. Cattell's research interests in intelligence and personality, and his holistic but empirical approach to psychological problems make multivariate analysis an ideal tool for his purposes, althougn it is not the only one he has used.

The contrast between Cattell's carefully constructed multivariate model of personality and the speculative theory of motivation[3]

in which it is grounded is striking, as Pervin (1970) points out.

> (Cattell's) emphasis on objective test instruments, large samples of tests and subjects, and factor analysis of the data suggest little personal bias in theoretical formulation. However, at times Cattell goes far beyond the data to formulate theoretical principles. This is particularly true in his formulation of the principles of motivation in personality. It is here that we learn that Cattell views man as an energy system functioning in accordance with the principles of reinforcement and tension reduction.
>
> . . . .
>
> This is a view similar to Freud's in that motivation is conceptualized in terms of energy that may be transformed from one form into another and then discharged.
>
> . . . .
>
> It is also true that Cattell's view of motivation has some resemblance to the Hullian learning theory concept of drive strength. In both cases, the organism is viewed as experiencing tension and then obtaining reward through the reduction of this tension (p. 388).

We believe, however, that Cattell's speculative views on motivation are in keeping with his general theory of how research in psychology must progress, which he labels the Inductive-Hypothetico-Deductive Method (IHD) (Cattell, 1966). He believes that any significant scientific research really starts with a creative exploratory phase, not a working hypothesis, and that inductions and deductions follow from this in both the hypothetico-inductive and the hypothetico-deductive form. He does not believe that science consists only of purely objective observation and evaluation but recognizes that it must also have strongly rationalistic and intuitionistic components.

Cattell's claim, basis to his IHD method, that hypotheses should be vague and tenuous (1966, p. 13), is implicit in Kuhn's (1963) remarks on the nature of creative scientific research and also in Cronbach's (1957; 1975) discussions of the two disciplines of

scientific psychology.

Cattell has also argued that multiple rather than single hypotheses are necessary to protect the objectivity of science against the autistic nature of man (1966, p. 17), i.e. man's inherent wish to have reality conform with his own point of view. He believes that the assigning of probabilities to alternative hypotheses is a much less arbitrary approach than the use of a single t-test of a difference common in bivariate analysis. But while the arbitrariness of dependent-independent variable relationships in bivariate analysis may be a distortion of the real underlying structure from which they are drawn it does not follow that the multivariate approach of covering all possible sources of variance will guarantee an undistorted model of reality (Holt, 1962).

Cattell's theory of personality

In his personality research Cattell has been basically concerned with its structure and his basic structural element is the trait, an inference from behavior which expresses some relatively permanent pattern or regularity in this behavior. The definitive characteristic of a trait is that it is continuous and it is this quality which allows for correlation, making personality scales, which consist of a series of bipolar categories, possible. 4

The difficulty with a trait approach to personality is that too many traits have been 'discovered' to be handled meaningfully and that the choice of traits for inclusion in a given personality scale has often been somewhat arbitrary, depending upon the individual

psychologist's opinion. Traits, as the term is popularly used, can be distinguished in several different ways. Some appear to be constitutionally determined while others are clearly environmentally determined. Some are common to all people and some are unique to the individual. The two distinctions between traits which Cattell takes to be of particular importance are between source and surface traits and between ability, temperament and dynamic traits (Cattell, 1971, pp. 11-12).

Cattell believes that the chief value of a factor analytic approach to personality research is its potential for distinguishing source traits from surface traits. The problem with older trait theories has been that they functioned at the level of surface traits leaving them open to investigator bias (Pervin, 1970, p. 394). A surface trait expresses a cluster of associated behaviors but, unlike source traits, these behaviors do not vary together to form a unitary, independent dimension of personality. It is the ability to uncover the origins of systematic variance of behaviors which makes factor analysis such a useful tool for personality research.

How are the source traits discovered which are then formed into scales through the application of factor analysis? According to Cattell (1959) there are three sources of data:

L-data: behavior in everyday situations

Q-data: questionnaire data which depends on introspection

(O) T-data: objective tests which disguise the relationship between the response and the personality characteristic being measured.

Cattell's research strategy was to find source traits in L-data and

then to determine if questionnaires and objective tests could be developed to reflect and test the same traits (Cattell, 1959). This approach was based on several assumptions, one being that the same traits can be obtained from all three data sources, and another being that the entire range of personality behaviors is reflected in the language we speak.

Cattell began his research on personality by deriving a basic list of trait names from various sources, including a 3000 item list compiled by Allport and Odbert at Harvard (Cattell, 1970, p. 55). He then reduced the list to about 200 characteristics through an analysis of synonyms. Cattell's next step was to rate 100 adults on these characteristics and, through analysis of the resulting data, he was able to derive 42 bipolar variables, e.g. assertive-submissive, adaptable-rigid. Then a large representative sample of adults was rated on these variables and the ratings were factor analyzed. To the twelve L-data factors which emerged (later expanded to 15) Cattell attached very obscure names, his stated purpose being the avoidance of ready but wrong interpretations. One example of an L-data trait is cyclothymia-sizothymia which includes such dimensions as trustful-suspicious and emotionally expressive-reserved.

The second part of Cattell's research strategy was to determine whether factors comparable to those for L-data could be found in Q-data. The end result of this particular line of investigation was his now famous 16 PF (Sixteen Personality Factor Inventory). 5 By designing literally thousands of questionnaire items, administering them to large groups of people and factor analyzing the results the

Q-data factors were established independently of the L-data factors, although the latter were used as a source of hypotheses in designing questionnaire items. After independently establishing the Q-data factors it was found that twelve source traits were common to both data sources. However, this is not a compelling argument for an underlying reality which corresponds to these factors since the L-data factors from which the Q-data factors were derived may conceivably have been based on faulty interpretations.

L-data is rather loose since it depends upon description at a popular level. Q-data is open to distortion since it depends upon uncontrolled introspection. For these and other reasons, Cattell has largely concentrated upon T-data in his research. T-data are derived from objective tests and therefore, theoretically, it provides the least biased source of information available to the correlational psychologist. Cattell's aim in his T-data research has been to develop objective tests, as defined by him,[6] that would measure the source traits already discovered in his L-data and Q-data researches and to this end he has developed more than 500 tests. These tests range all the way from the usual speed tasks and measures of perceptual-motor rigidity to a word-association test and even a report of dreams. For example, he has hypothesized that assertiveness might be indicated by such diverse behaviors as long exploratory distances on a finger maze test and fast speed of letter comparisons.

Cattell's theory is based on the assumption that source traits are the basic stuff of which personality is composed. As such it should be possible to identify them equally through all three data sources.

Yet he has not really succeeded in doing this. He has established 21 T-data source traits but they cannot be directly related to the traits found in the other two data researches. When second-order factors are derived from Q-data traits some comparisons with T-data are possible. Certain other complex relationships also exist among the three data sources but nothing direct and simple and compelling in terms of Cattell's original argument. In other words, this very sophisticated structure has not entirely confirmed the assumption upon which it was founded. In considering how Cattell has extrapolated his creativity theory from his personality theory this discrepancy should not be overlooked.

The personality profile of the creative person

Unlike many other personality theorists, Cattell considers intelligence to be the prime requisite of creativity. However, he has concentrated on determining which personality traits seem to be most commonly associated with this creative intelligence. His method has been an unusual combination of biography ((1959), 1963), historical theory (1950) and factor analysis (1968). On the basis of these diverse researches, Cattell claims to have discovered a distinctive personality profile for proven creatives which shows only minor variations across different subject areas.[7]

From Cattell's study of history he developed a theory of cultural pressure (1950). He speculated that in periods of history when life was particularly complex and demanding the characteristic human reaction was pugnacity which generally leads to war. However, when this outlet is unavailable or insufficient, anxiety and sublimation

set in and out of this has developed the outstandingly creative periods of human history. By correlating a large number of group characteristics across 80 nations Cattell developed a factor analytic pattern of cultural pressure (illustrated by the following table (Cattell, 1971, p. 419, adapted.)

Table 2

The Nature of the Cultural Pressure Dimension	Factor Loading
High creativity in science and philosophy	.91
High frequency of cities over 20,000	.78
Large number of clashes with other countries	.70
High musical creativity	.70
Many Nobel prizes in science, literature and peace	.67
Large number of riots	.66
High ratio complex: primary occupations in population	.64
Large number of foreign treaties contracted	.60
More frequent involvement in war	.58
Climatic stimulation (Huntington's Index)	.37

Cattell explained the high positive correlation of creativity and stress which this factor analysis revealed by hypothesizing that (1971)

> . . . what characterizes a society which is adjusting to complexity is probably an increase in introversion and certainly an increase in superego control. . .(p. 419).

This assumption was based on his parallel biographical studies of proven creatives (1963), which indicated to him a strong connection between introversion and creativity.

The relationship between introversion and creativity is one of the key assumptions underlying Cattell's factor analytic theory. It is a connection which runs counter to the American Zeitgeist and therefore to the majority of American creativity research.[8] High scorers on Guilford's divergent thinking factors, for example, are likely to appear more extroverted than introverted, at least in the popular sense in which this concept is usually understood.

It has been repeatedly pointed out in the literature that Guilford's fluency measure can be easily confused with verbal glibness which presupposes that lack of reserve characteristic of the extroverted personality. Also, several flexibility factors have been associated with cognitive style which can be presumed to be much influenced by personality. The introverted, reserved person, who according to Cattell (1972), ". . .is likely to be precise and 'rigid' in his way of doing things (p. 17)." would be unlikely to score well in a time test of flexibility. Originality, as defined by Guilford, would probably also be affected by introversion. One of his tests for measuring originality is the number of clever titles to story plots that E can produce within a set time. It seems reasonable to assume that the spontaneity necessary for this task would be fostered by a lack of inhibition.

It is possible to explain the discrepancy between Cattell's and Guilford's picture of the creative personality by pointing out that introversion-extroversion is now recognized by Cattell, Eysenck and other factor analytic theorists of personality to be a second order factor. As such it can be understood not as a particular personality trait but as a broad, over-all life orientation. Several primary factors on Cattell's 16 PF contribute to his introversion facter. In the case of creatives these factors tend to load in a characteristic way which has led him to speculate that the creative is constitutionally an extrovert who has been made into an introvert through environmental circumstances (1968, p. 299). This is why, according to him, that high dominance (E), self-sufficiency (Q_2), radicalism (Q_1) and low

superego (G) can exist side-by-side with reserve (A-), reticence (F) and sometimes dependency (I).[9]

Cattell (1971) suggests that the "impulsive exvia" which has been taken for extroversion in the past is ". . . antipathetic to true creativity and the fact that it has been held up as a norm and an ideal in school is not unconnected with the present belated search for a lost creativity (p. 419)." He believes that stress and even war can enhance creativity of the genuine sort, while the deliberate fostering of "creativity" in the popular sense, i.e. spontaneity, openness, self-expression and verbal fluency, unwittingly destroys it. He states (1971) that

> Creativeness must come from the individual but it is the task of society to produce the climate in which introversion and restraint are viable styles of life (p. 419).

Cattell's claim that the American emphasis on sports, competition, and "all-aroundness" works against the fostering of creativity in the schools is not without substantiation from other sources. Broadbent (1958), an information-processing theorist, has expressed the same point in different language by saying that as long as a lot of channels are being used for input too few are available for scanning. In a prosperous, materialistic society where immediate gratification is the norm and where "intelligence" in the form of verbal glibness and quick-wittedness is highly valued there is little incentive for engaging in the drawn-out, invisible, mental process that leads to high level creativity. At the same time, there is much incentive for engaging in "divergent thinking processes" that lead to problem-solving, technical innovations and, in general, what Ghiselin (1963) has

referred to as second-level creativity. As Kuhn (1963) has pointed out, contemporary America is rich in inventors and innovators but relatively poor in first-level creative scientists.

What, in conclusion, can we say about Cattell's contribution to creativity theory? Although, like Guilford, he has relied primarily on multivariate analysis for interpreting his data, we believe that Cattell's model is the more broadly based of the two. His E's have been eminent researchers whom Cattell considers, with justification, to be proven creatives. He has used their biographical information as a source of hypotheses about the creative personality. The 16PF, which he used for developing his creativity profile, is an independently researched and well validated instrument. By contrast, Guilford's divergent thinking factors are an integral part of his SI model and their inter-dependency with convergent thinking factors has already been noted.

There are, however, certain questions one might raise about Cattell's model. We would like to know what the variablity, the overlap of scores, is between creatives and non-creatives. Also it does not seem to us that Cattell has taken into account the actual intellectual processes through which an individual becomes creative, even though he has often acknowledged that this is a fundamental aspect of creativity. Finally, in equating "proven creatives" with eminent researchers and assessing actuality instead of potentiality, as Guilford does, Cattell has risked confounding his measures with other qualities closely related to success but not necessarily to creativity in itself.

Notes - Chapter V

1 Significant questions about the relevance of factor analysis at the meaning level have been raised by various psychologists. Overall (1964) has demonstrated its limitations by performing a factor analysis on the physical dimensions of books. He interpreted his results, the identification of dimensions resembling size, obesity and squareness rather than the usual height, width, and thickness, as an instance of the way factor analysis can distort the underlying "real structure" of an object.

2 There are two major unresolved problems in factor analysis:
(a) how many factors should be extracted?
(b) what should be the communalities?
If one knew how many factors to take out, the communalities could be found, and if one knew what communalities to use the number of factors could be found.

3 The basic assumption underlying Cattell's analysis of motivational processes (Cattell, 1968, pp. 71-87) is that attitudes, which he defines as a readiness to act in a certain direction in a given situation, operate at a fundamental level of personality. In factor analysis of T-data on attitudes he isolated five major components: conscious id, ego expression, ideal self or super ego, physiological need expression and repressed complexes. Through further factor analysis Cattell also found two second-order factors: the integrated (ego and super ego) and unintegrated components (all the others) of interests. His distinction is between controlled and uncontrolled interest components within a given attitude. He also distinguishes between innately and environmentally determined attitudes as ergs and sentiments, respectively. The unifying structure believed to underly them which others call self-image Cattell calls self-sentiment.

The most speculative of all Cattell's major assumptions about personality is his image of a dynamic lattice. It is through this that he explains the relationship that must exist among ergs, sentiments, and attitudes. The attitudes are linked to certain sentiments which in turn are related to certain ergs. The ergs are the basic source of energy within Cattell's motivational system, functioning somewhat like the Freudian libido. As in the psychoanalytic model there is a built in potential for conflict since the satisfaction of one erg necessitates the frustration of another.

Cattell's personality and motivation systems are joined together by his specification equation, his attempt to explain what an individual will do in any given situation by taking account of temperament, traits, attitudes and abilities which affect all of these, as well as certain transient variables. Two examples he gives of the latter are states and roles. A person's behavior will be affected by his mood at the moment, e.g. anxious or calm, elated or depressed, and also by the way he perceives himself in the situation, e.g. as parent, friend or bystander.

4 Correlations can be obtained for variables which are not continuous, e.g., tetrachoric (although this assumes underlying continuity) and point biserial.

5 See the excerpts from Cattell's manual for the 16 PF in Appendix B.

6 Cattell & Butcher (1968) state that

> By an objective personality test we mean a miniature situation, possibly involving laboratory apparatus, in which the subject cannot identify the particular aspects of behavior on which he is being assessed, or, if he can discern them, he cannot effectively influence the score (p. 63).

7 See charts on following pages.

8 Donald MacKinnon, in his article entitled "The highly effective individual" (1967), describes a similar picture of the creative person.

> One of the most striking observations we have made is that the creative person seldom fits the layman's stereotype of him. In our experience, he is not the emotionally unstable, sloppy, loose-jointed Bohemian. More often, it is the unoriginal and uncreative person who appears to be artistic, clever, emotional, whereas we discover ourselves using such adjectives as deliberate, reserved, industrious, and thorough to describe truly original and creative persons.

9 One of Cattell's most significant research findings in the area of creativity has been that the similarities between proven creatives in different areas greatly outweigh their differences, as the charts on the following pages indicate. That is to say, he has discovered a personality profile which is unique to the creative. Apart from high intelligence, the greatest deviations from the average which occur in this "composite, central profile" are high self-sufficiency (Q_2), introversion (Q_1), dominance (E), and desurgency (F). The creative person, according to Cattell (1971), is sober and inhibited in terms of his relationships with other persons but, at the same time, assertive and independent-minded (pp. 406-443).

While a common creative profile has emerged from Cattell's data, this same data reveals some important differences between creatives in different disciplines. Artists, scientists and literary creatives (table 1) differ significantly from each other on C factor (ego-strength), H factor (shyness vs. social boldness) and O factor (untroubled adequacy vs. guilt proneness). Another sharp difference he has found is in degree between the profiles for academic and applied creative researchers (table 2). Academics have consistently more extreme sten scores than applied researchers, a finding which corresponds with Ghiselin's (1963) hypothesis of two levels of creativity.

Table 3

Personality Profile Common to Those Creative in Science, Art, and Literature

Source Trait	*Direction*		*Scientists*	*Artists*	*Literary*	*Artistic and Literary Creators same or different from scientists*
			(114)	(64)	(89)	
A	(−)	Sizothyme	3.4*	3.0*	3.9*	S
B	(+)	Intelligent	9.1*	8.3*	8.8*	S
†C	(+, −)	Ego strong and Ego weak	6.9*	5.1*	4.2*	D
E	(+)	Dominant	7.2*	5.6	6.0*	S
F	(−)	Desurgent	3.5*	3.3*	4.0*	S
G	(−)	Casual	3.4*	5.1*	4.7*	S
†H	(+, −)	Parmic and Threctic	6.5*	5.2*	4.9*	D
I	(+)	Premsic	7.1*	8.9*	7.8*	S
L	(−)	Alaxic	4.1*	5.2	5.4	S
M	(+)	Autious	5.5	8.8*	6.8*	
N	(+)	Unaffected	5.5	4.7*	5.2	
O	(+, −)	Poised and Guilt Prone	3.8*	6.1	6.1	D
Q_1	(+)	Radical	6.2*	6.9*	7.3*	S
Q_2	(+)	Self-Sufficient	6.5*	8.9*	9.2*	S
Q_3	(+)	Strong in Self-Sentiment	6.8*	6.0*	5.9*	S
Q_4	(−)	Low in Ergic tension	5.1*	5.2*	5.3	S

* = Significantly different from general population at $P < .05$ or beyond.
† A plus *and* a minus means above average in one area of creativity and below in another.

The data are from Cattell and Drevdahl, 1955, and Drevdahl and Cattell, 1958, in nationally eminent U.S. figures. Drevdahl's general writers and science fiction writers have been pooled in the literary group. The intelligence results are on a revised standardization of Factor B, the earlier translations of the 1956 values being too low. The artists and writers always deviate the same way, but the scientists differ, in agreement with Terman's observations, in being more emotionally stable and less anxious (C+, H+, O−).

As is found in occupational selection, so here, what distinguishes the group from the general population is now always what distinguishes the better from the poorer number. Thus in later work by Drevdahl (unpublished at his death), it was found in a comparison of creative and uncreative psychologists that the former showed significantly higher super-ego strength, G, and lower autia, M, though in other respects, e.g., B, E, F, etc., they deviated as the group does from the general population. Similarly Cattell and Drevdahl found that researchers relative to equally gifted administrators, were more A−, F−, and Q_3+, just as they are in regard to the general population. Drevdahl also found on the MAT test (Cattell, Horn, and Sweney, 1964) a significantly greater attachment of the creative to their home interests. (See also, on the artist profile, Cross, Cattell, and Butcher (1967), who found artists introverted (in contrast to the popular stereotype) but still more anxious and emotional, and lower in superego, than here.

(Cattell, 1971, p. 411).

Table 4

*Profile of Basic and Applied (Industrial) Researchers**

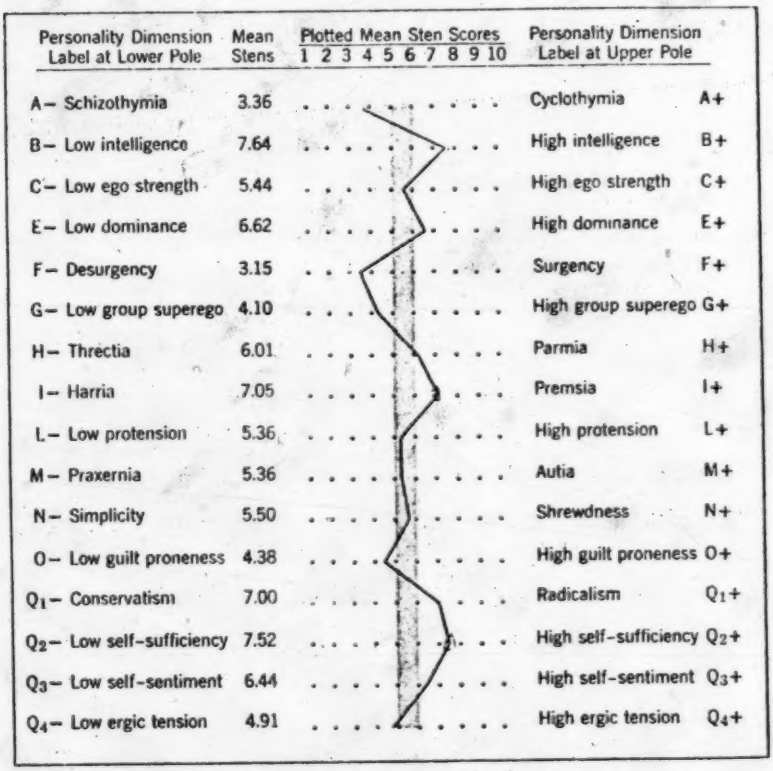
Personality source trait (labeled in the mean researcher direction)	*Means on Source Traits*	STANDARD TEN SCORES (*Stens*) 2 3 4 5 6 7 8 9
Sizothyme	3.36	A
Intelligent	6.78	B
Ego strong	6.88	C
Dominant	7.24	E
Desurgent	3.50	F
Superego	3.40	G
Threctic	6.65	H
Premsic	7.10	I
Alaxic	4.12	L
Autistic	5.52	M
Shrewd	5.50	N
Not guilt-prone	3.76	O
Radical	6.20	Q_1
Self-sufficient	6.54	Q_2
Strong self-sentiment	6.78	Q_3
Low frustration	5.12	Q_4

Academic creative researchers ——
Industrial, applied creative researchers - - - - - -

(Cattell and Butcher, 1968, p. 293) Based on combined data from several sources representing chemists, chemical engineers, physicists, psychologists and biologists.

Table 5

Mean 16 Personality Factor Profile of Eminent Researchers ($N = 140$) in Physics, Biology, and Psychology



NOTE: A new "control" group for the general adult male population has become available since this profile was first published. The present sten values for researchers are based on a compromise—the means—as derived from the old and the new control groups. Except for C, which was formerly above average, no significant changes occur.

(Cattell, 1963, p. 125)

Chapter VI

The "Creative" Architects of Donald MacKinnon

In collaboration with Frank Barron [1] and others, Donald MacKinnon has carried out extensive investigations of creative persons in the Institute of Personality Assessment and Research (IPAR) at Berkeley. While creatives from many different fields have been examined in this research project, MacKinnon's special interest has been creative architects. Like Cattell, he is interested in the personality rather than the intellectual correlates of creativity. A perusal of his bibliography indicates that his publications, beginning in the mid-twenties, are mostly concerned with personality theory and assessment. During the sixties he focused primarily on the subject of the creative personality but his most recent article on creativity appeared in 1971.

Although MacKinnon's approach to the study of personality, including creative personality, has been basically a psychometric one, there is evidence in his articles on creativity of a strong clinical interest, as was found to be the case with Cattell. His theoretical rationale and research design were described in several of his early articles. The two which appear to deal with these issues most thoroughly and which accordingly will be referred to most frequently in this section are MacKinnon (1962a) and (1962b).

Unlike certain others who have set up elaborate research designs

for assessing creativity, MacKinnon began his project with a clear-cut three part definition of creativity. According to him, true creativeness must fulfil at least three conditions: novelty, reality-orientation and original insight fulfilment. Like Mednick and Guilford, he is willing to define novelty operationally as statistical infrequency of response. This is held in check, however, as it is by Mednick, in MacKinnon's insistence that the novel solution be reality-oriented. That is to say, it must solve a problem or fit a situation appropriately. It cannot be merely random, like a monkey's drawing.

The fulfilment of original insight is an interesting requirement which distinguishes MacKinnon's definition of creativity from those which equate it with problem-solving. The latter are goal-oriented and, as such, call for insights which fulfil the solution rather than solutions which fulfil the insight. Perhaps one could call such phenomena "applied insights"!

MacKinnon feels that two major consequences for his research devolve from this definition of creativity. It has restricted his research team to the study of actualized creativity only rather than the performances of individuals on "so-called tests of creativity ((1962a), 1973)" which MacKinnon does not consider to be valid indicators of creative ability. He says, in obvious reference to Guilford divergent thinking measures, that

> While tests of this sort, that require that the subject think, for example, of unusual uses for common objects and the consequences of unusual events, may indeed measure the infrequency or originality of a subject's ideas in response to specific test items, they fail to reveal the extent to which the subject faced with real life problems is likely to come up with solutions that are novel and adaptive and which he will be motivated to apply in all their ramifications (p. 485).

Another aspect of MacKinnon's creativity theory which has affected his research design is his belief that artistic and scientific creativity are fundamentally different in certain ways and, as such, cannot be equated. He holds that artistic creativity is an expression of the creator's inner states, i.e. his needs, perceptions, motivations, while scientific creativity is not. The creative scientist, in his act of creation, operates on some aspect of his environment to produce a novel and appropriate product but this product is unrelated to him as a person. However, MacKinnon also talks about mixed domains of creativity, citing mathematics and architecture as examples.

In his research project at Berkeley, MacKinnon and his associates have assessed many different types of artistic, scientific and mixed creativity. They have examined creative writing, architecture, mathematics, industrial research, physical science and engineering. MacKinnon, himself, has concentrated on creative architects because he believes they manifest more of those qualities which have been found to be most generally characteristic of creative persons, both artistic and scientific, than creatives in any other area (1962b, p. 485).

In setting out to examine creative architects MacKinnon (1962a) had first to obtain a sample. He settled on 40 as a suitable number, decided that the sample should be drawn from architects currently practising their profession in the United States, and then asked five professors of architecture at the University of California, Berkeley, "each working independently", to nominate the 40 most creative architects in the country. He received a list of 86 names of which only 13 were nominated by all five panel members while 40 were individual

nominations. Members were also asked to rate the creativity of their candidates on a five-point scale and to provide brief evaluations of the work of each one to indicate the basis for their selection.

In his various publications on this subject this is all the information MacKinnon provides on the rationale for his initial selection procedure. On the basis of this information several questions remain unanswered. First, it is not clear whether or not MacKinnon imposed his definition of creativity on his panel but, in the absence of definite information, it seems more reasonable to assume that he did not. This seems to us to be a negation of the purpose behind the elaborate definition of creativity he proposed at the beginning of his study. Secondly, we might ask why MacKinnon restricted the panel membership to professors of architecture at one university? Proximity seems the likely answer although it is not the most satisfactory one. Thirdly, we would like to know what proportion of the department of architecture at Berkeley in 1971-72 when this study was done was invited to participate in this panel and what the rationale was for choosing these five out of what must surely have been a much larger department.

It would also be interesting to us to know exactly what MacKinnon means by "working independently". Does he mean that the five panel members were instructed not to confer with each other while drawing up their lists or does he mean that they were academically so diverse that there was little possibility of an automatic consensus? Whatever is meant, it is difficult to believe that a certain bias would not prevail within such a restricted group. Apart from the general

awareness of a few famous names, it seems reasonable to believe that a close enough acquaintance with other architects to allow for evaluation would be affected by geographical considerations. Department orientation would also seem to be a likely factor when one considers that it is contemporaries who are being assessed so that the benefits of hindsight are not available.

Aside from the physical proximity of the panel members and the resulting possibility of group bias, the question arises as to whether or not professors of architecture, as a class, are necessarily in the best position to assess creativity in practising architects. There is no evidence to indicate that MacKinnon's panel members had made any outstanding contributions to the field themselves. The fact that they were all members of one department weighs against rather than for this possibility. If, in fact, "It takes one to know one" and "Hindsight is better than foresight" then, the possibilities of confusing a high level of productivity and/or socially valuable innovativeness (Ghiselin, 1963) with true creativeness, as MacKinnon terms it, would seem very high in this case.

Whatever might be said about MacKinnon's choice of panel members he did employ a number of statistical cross-checks throughout the selection phase of his study in order to make sure his results were as valid as possible under the circumstances. After finding such a disparity in nominees each panel member was asked to rate the creativity of those nominees not included by him originally, assuming he knew them well enough to do so. With this information MacKinnon was able to rank order the 86 nominees and to invite them, in that order, to participate in his study. However, in order to get 40 acceptances, it

was necessary to drop down to the 25th percentile to reach the designated sample size. However, MacKinnon, anticipating this argument, converted the mean ratings of creativity of each of the 64 architects to standard scores and, upon comparing the group means of the 24 who declined and the 40 who accepted his invitation, found the two to be virtually identical, 50.0 vs. 50.1, with very similar standard deviations, 9.9 vs. 9.5, respectively.[2] On the strength of this, MacKinnon ((1965), 1973) says

> We can make no claim to have studied the most creative architects in the country. We are assured, however, that the 40 whom we did assess . . . are as a group indistinguishable in the level of their creativeness from the 24 who declined to be studied (p. 78).

MacKinnon's selection rationale was also validated by other procedures than those outlined to this point. To further compare the two groups, i.e. the assessed vs. the unassessed, he requested 14 editors from four major American architectural journals to rank order the 64 nominees in question from most to least creative. Eleven complied and when their mean rankings were converted to standard scores and group means were derived from these rankings they were found to be 51.9, SD 8.0 vs 48.7, SD 6.1 for the non-assessed and the assessed groups respectively. The difference in group means was not found to be statistically significant.

A factor that might be kept in mind in comparing the rank orderings by the editors of the 64 invited architects to the rank orderings of the original 81 by the professors is that two totally different sets of group dynamics were involved. The editors were not asked to make their own list of creative architects, even though they might well have been in a better position to do so than the professors,

but, rather, to order a restricted list set up by others. Also, evaluations were not asked of the editors so this information could not be used, as it was in the first case, to temper the rank orders. The two procedures can hardly be considered equivalent then, and comparisons based on them seem somewhat questionable.

One of MacKinnon's basic procedures throughout the history of his research project on creativity has been to offset whatever shortcomings might emerge in "quality control" by an elaborate series of checks and cross-checks with as many different measures as he and his associates could contrive. In the particular problem under consideration here, i.e. the comparative rated creativity of the 40 participants in the study vs. the 24 non-participants, he used a third statistical check: rank ordering of the 64 nominees by the 40 actual participants, themselves. He found a very high correlation between their ratings and the editor's ratings (MacKinnon, 1962b).

> Since the editor's ratings of the creativity of the architects correlated +.88 with the architect's own ratings it is clear that under certain conditions and for certain groups it is possible to obtain remarkable agreement about the relative creativeness of individual members of a profession and thus meet the first requirement of an effective study of creative persons (p. 486).

Of the various cross-checks mentioned so far, the above finding would seem the most impressive. However, again it must be kept in mind that the editors were rank-ordering creativity within a highly restricted group. This adds support for the internal consistency of the findings but says nothing of their overall validity as viewed within the larger context. As for the validity question, the fact that this study of architects was only part of a much larger research project, i.e. the

assessment of creative writers, research scientists and others previously mentioned, does not mean that the problems raised here can be assumed to be reduced to inconsequential levels through numerical manipulation since similar procedures might have led to a similar confounding of the data in the other areas.

Control Groups

MacKinnon included in his initial study of creative architects two control groups to ensure that group characteristics would not be confused with genuinely creative characteristics. His Groups 2 and 3 were matched with the creatives from Group 1 for age and geographic location. In addition, Group 2 architects were selected for having two or more years of work experience with a nominated (1) creative. By contrast, Group 3 members were chosen from those architects who had never had any professional contact with any of the 81 nominees from which Group 1 was derived. Samples were gathered by consulting the Directory of Architects, 1955.

Group 2 was formed of 43 architects and Group 3 of 41. They were not ranked and were assessed only through the results of six or seven hours of self-administered tests chosen from the total assessment battery. To ensure that the three groups were representative of the entire profession of architecture, the selection procedure was checked in two additional ways: prominence gained through publications and independent ratings of creativity (MacKinnon (1962a), 1973).

> . . . two indices of publicity or prominence and by inference also indices of creativity were computed: (a) a weighted index of the number of articles by or about each architect and his work referenced in the

Architectural Index for the years 1950-58, and (b) a weighted index of the number of pages devoted to each architect and his work for the same period (pp. 291-292).

Indices of Publicity or Prominence

	Group I	II	III
Articles by or about each architect, 1950–58	131	20	3
Pages	97	13	2

Table 6

MacKinnon devised another technique for rating the creativity of the 124 architects involved in his study. Six groups of architects, composed as follows, were asked to rate the creativity of the above:

1. the five members of the original nominating committee
2. six editors of major architectural journals (American)
3. 19 professors of architecture distributed nation-wide
4. the 32 architects 1
5. the 36 architects 2
6. the 28 architects 3.

The study-architects were rated individually on a 9-point scale by all the raters who knew them well enough to offer a meaningful assessment. Group means were then calculated and, as Table 7, below, indicates, there were mean differences in rated creativity between all groups which were found to be significant beyond the .001 level (MacKinnon (1962a), 1973, p. 293).

Mean Ratings of Creativity on Nine-Point Scale of 124 Architects Separated into Three Groups

Groups rated	*Mean rating*	*SD*	*T-ratio*	*P Value*
Architects I	5·46	0·43	10·795	⩽0·001
Architects II	4·25	0·56	4·908	⩽0·001
Architects III	3·54	0·74		

Table 7

MacKinnon's rating procedure, as outlined above, seems very thorough indeed. However it is necessary to ask one question. Was the overall group mean calculated by averaging the six smaller group means or by working with individual ratings. In the latter case the ratings by the study-architects would have overwhemingly influenced the results. Even in the former case, the three study-architect groups collectively would have had the largest unified influence on the ratings (50%) if one assumes that there may have been unifying factors underlying their ratings. But why assume this? The gap between theory and practise in terms of values and general life orientation has been commented upon by sociologists and others in reference to many disciplines. If nobody has researched this specifically on architects it still seems unlikely that they are very different in this respect from other professions. Therefore, it seems likely that practising architects might have a very different attitude towards creativity than editors and academicians. As such, combining the means, whichever way it was done, entails a confounding of the data. The inclusion of t ratios for samples drawn from such obviously unhomogeneous populations is not particularly helpful in resolving this quandary.

It might well be asked at this time why these somewhat slender points are being laboured so intensively. This is being done because of the conclusion MacKinnon reached on the basis of the rating criteria which we have outlined ((1962a), 1973).

> Having demonstrated that the three groups do indeed represent significantly different levels of creativity, we can examine data obtained from them to discover the personality correlates of creativity and more specifically the distinguishing characteristics of creative architects (p. 292). 3

The entire assessment portion of his research design is based on the assumption that Group 1, as a group, possesses significantly greater creative potential than Groups 2 and 3. The task MacKinnon set himself was to find out why. If Group 1 had been initially rated as creative through a confounding of creativity with productivity, innovative ability, notoriety or other perhaps related but not equivalent qualities (as we are suggesting here), then it would follow that any analysis of the qualities that made them creative, however sensitively it was done, could not be accurate.

The rather perfunctory assessments of Groups 2 and 3 is further indication to us that the initial creativity ratings were taken very seriously. These groups were not tested in person at all but worked independently at home to complete a limited selection of tests from the assessment battery. Accordingly, assessment in certain areas such as intelligence was not possible. What tests were given to Groups 2 and 3 were also given to Group 1, however, so that quite a number of comparisons were possible, but the lack of comparison in the area of intelligence is unfortunate in light of the positive correlation between

creativity and intelligence that Guilford, Cattell and many others have found. MacKinnon, however, has found a fairly low threshold value of intelligence necessary for creativity to occur and he compares the intelligence of his Group 1 architects with many other professional groups, finding them to be about average in terms of this (above-average) population.

Staff assessments for Groups 2 and 3 were not possible in the absence of personal contact but self-assessments for all groups were done and showed some interesting differences. Group 1 showed a high level of self-acceptance, using such terms as inventive, determined, individualistic, industrious, enthusiastic, and independent. By contrast, Groups 2 and 3 emphasized such qualities as good character, rationality and concern for others. This self-rating is consistent with their respective scores on the California Psychological Inventory (1957) where Group 3 showed a far higher degree of socialization (responsibility, self-control, tolerance, good impression and communality) than Group 1, and Group 2 was in the middle. A summary description of the CPI profile of the creative (Group 1) architect is provided by MacKinnon (1962b, p. 490). It, too, is congruent with their self-descriptions. [4]

Staff assessments of Group 1 provide a basically similar picture but perhaps with one or two striking differences. Using the ACL, Gough Adjective Check List (1960) the following adjectives were checked for 80-100% of the architects in Group 1 by three or more of the ten staff members. In descending order, they are: alert, artistic, intelligent, responsible, ambitious, capable, cooperative, civilized, dependable,

friendly, pleasant, resourceful, active, confident, industrious, reliable, conscientious, imaginative, reasonable, enterprising, independent, interests wide, adaptable, assertive, determined, energetic, persevering, sincere (82%) and individualistic, serious (80%).

This very positive impression was confirmed in a second evaluation done by the staff using the 100-item Q-sort (Block, 1961). After sorting the 100 psychodynamic descriptions into nine piles for each architect and compositing the sortings of all staff members, the fifteen top statements were found to be the following ((1962a). 1973).

Rank	*Item*
1.	Enjoys esthetic impressions; is esthetically reactive.
2.	Has high aspiration level for self.
3.	Values own independence and autonomy.
4.	Is productive; gets things done.
5.	Appears to have a high degree of intellectual capacity.
6.	Genuinely values intellectual and cognitive matters.
7.	Concerned with own adequacy as a person, either at conscious or unconscious levels.
8.	Is a genuinely dependable and responsible person.
9.	Has a wide range of interests.
10.	Behaves in an ethically consistent manner; is consistent with own personal standards.
12.	Has social poise and presence; appears socially at ease.
12.	Enjoys sensuous experiences (including touch, taste, smell, physical contact).
12.	Is critical, skeptical, not easily impressed.
14.	Appears straightforward, forthright, candid in dealings with others.
15.	Is a talkative individual.

Table 8

In the preceding descriptions certain disparities can be observed. Sincerity fell relatively low on the ACL at 82%. When this is conjoined with number 7 on the Q-sort (concern with own adequacy as a person. . .) which MacKinnon singles out as the only

non-positive finding, we feel that a discordancy appears in the picture of the creative person presented in this research project.

In reporting the selection of Architects 1, MacKinnon (1962b, p. 487) comments on some apparent differences in attitudes towards psychological research between those who accepted his invitation to participate in the study and those who rejected it out of choice rather than necessity (previous commitments, etc.). MacKinnon describes the accepters as obliging, anxious to participate and interested in furthering research on creativity. The rejecters, by contrast, are described as having refused angrily, decrying the audacity of pschologists for thinking they can study the creative process scientifically. If these attitudes can be taken to reflect deeper personality differences, a point MacKinnon does not pursue, and if, as MacKinnon himself says ((1962a), 1973), the respective group creativity ratings of the refusers and accepters is identical, then we must wonder about the relatively low sincerity level and the concern with own adequacy found in the Q-sort and ACL done on Group 1.

As Cattell (1970) has pointed out, questionnaires cannot be considered to provide as reliable a source of data as objective tests because they depend entirely upon the honesty of the subject being tested. It is possible for E to choose his responses for the purpose of creating a certain impression. When this fact is considered in conjunction with the relatively low sincerity rating and the apparent concern with adequacy and when it is considered that the staff ratings of Architects 1 were based on casual observations of total strangers made over a period of three days, of which most of that time was

probably taken up by the highly artificial situation of testing, and when it is remembered that these accepters were, according to MacKinnon, anxious to please in the first place, we are left wondering about the efficacy of the whole procedure. Unless this Q-data can be shown to be in striking accord with T-data its validity and reliability must be questioned.

Unfortunately, MacKinnon does not refer to any objective-test data except the MMPI, long used as an indicator of major psychiatric disturbances and, according to Cattell (1970, p. 328), "gradually supplanting the special gadget type of test" (eg. Rorschach). The MMPI is more objective than most personality inventories since its intentions are disguised but a test-sophisticated person would still be able to manipulate the results to some extent. This is not likely to have happened to any great extent in this case, however. It is interesting that the results obtained on the MMPI, in so far as comparison is possible, give a different picture than the ratings previously mentioned and the results of the CPI. Group 1 architects scored 5 to 10 points above the norm of 50 on this test.

MacKinnon speculates, as others before him have, that the elevated scores can be partially explained by the exceptional frankness, openness and complexity of personality which creatives tend to have. However, this does not explain the very high peak which turned up on the Mf scale, a femininity rating, which is repeated in the results for Group 1 on the Fe scale of the CPI and the M-F rating on the Strong Vocational interest scale.

That femininity should correlate significantly with creativity is partly due to our social definition of femininity which includes

such essential qualities of the creative person as sensitivity, openness to own feelings and wide-ranging interests. However, MacKinnon's assessment battery also revealed some pathology associated with this high Mf score. He commented that for at least some of his subjects, the masculinity-femininity balance was a "precarious" one which had been achieved at great cost. No direct explanation of this is given but in another study he did make some observations which might be relevant to this finding.

In "The highly effective individual" (MacKinnon, (1960), 1967) the life histories of creative persons in several fields are examined and a very unlikely picture emerges. Home lives were, for the most part, not found to be happy, stable and nurturing, and in some cases considerable trauma had been experienced. In a later article, however, which referred only to creative architects and used the Rankian model, a different approach was taken. MacKinnon ((1965), 1973), looking for contributing factors to the "strengthening of positive will", focused on slightly different aspects of the home situation. He emphasized the child's autonomy and lack of closeness to his parents, a wealth of role models for "the promotion of ego ideals", the lack of clear-cut standards of conduct within the family and the experience of a sense of isolation because of frequent moving, which presumably contributed to the development of a sense of self-reliance. In a more recent description (MacKinnon, 1975) referring to all his creative subjects in general, MacKinnon maintains that

> Despite wide diversity, the biographies of our creative subjects revealed several recurrent themes: an early development of interest in and sensitive awareness of their inner experience. . .such introversion of interest

> often stemming from an unhappiness or loneliness in childhood due to sickness, a lack of siblings or companions, a natural shyness, etc. . .(p. 82).

What emerges from these descriptions and others given by MacKinnon, when they are considered collectively, is that the typical background for MacKinnon's creative subject is not the typical middle class home where one or both parents go to considerable trouble to ensure that their children are happy and stimulated so that their natural spontaneity will be encouraged. The parents do not, in short, live for the children. MacKinnon says this has a "liberating effect". It is not surprising then that they should have elevated MMPI scores, which MacKinnon suggests would be much higher except for the abilities they have developed to function effectively in the face of stress.

Conclusion

In his research on creativity MacKinnon has made extensive use of established psychometric measures to produce his profile of the creative researcher and he has developed an interesting and unusual picture of that person's early family life ((1960), 1967). We believe that he has been able to do this because he has not been so heavily committed to a particular research technique as either Guilford or Cattell. Our chief criticism of MacKinnon's approach is of his selection procedure. Because of this it is not clear in the end if he is describing a creative person, a productive person or an "effective person" (MacKinnon, 1963).[5]

Chapter VI - Notes

1 Frank Barron has contributed extensively to the creativity literature and his special concern has been an examination of the creativity of writers because he feels that their form of creativity is the easiest to understand and the best expression of the culture from which it stems. He has found his creatives to score high on impulsivity, self-assertion and independence of judgment (CPI) and low on suppression (MMPI). They also have greater personal psychodynamic complexity as measured in their preference for complexity on the Barron-Welsh Art Scale (1952). He suggests that ((1955), 1973)

> . . . the preference for complexity is associated with a perceptual attitude which seeks to allow into the perceptual system the greatest possible richness of experience, even though discord and disorder result, while the preference for simplicity is associated with a perceptual attitude which allows into the system only as much as can be integrated without great discomfort and disorder, even though this means excluding some aspects of reality (pp. 281-282).

2 This data seems to suggest that the rank ordering and creativity ratings were unrelated either because they were very high and similar on both or because the ordering was essentially random. We question how much reliability there was in the ratings.

3 Our emphasis.

4 This description reads

> He is dominant (Do scale); possessed of those qualities and attributes which underlie and lead to the achievement of social status (Cs); poised, spontaneous, and self-confident in personal and social interaction (Sp); though not of an especially sociable or participative temperament (low SY); intelligent, outspoken, sharp-witted, demanding, aggressive, and self-centered; persuasive and verbally fluent, self-confident and self-assured (Sa); and relatively uninhibited in expressing his worries and complaints (low Wb).
>
> He is relatively free from conventional restraints and inhibitions (low So and Sc), not preoccupied with the impression which he makes on others and thus perhaps capable of great independence and autonomy (low Gi) and relatively ready to recognize and admit self-views that are unusual and unconventional (low Cm).
>
> He is strongly motivated to achieve in situations in which independence in thought and action are called for

(Ai). But, unlike his less creative colleagues, he is less inclined to strive for achievement in settings where conforming behavior is expected or required (Ac) In efficiency and steadiness of intellectual effort (Ie), however he does not differ from his fellow workers.

Finally, he is definitely more psychologically minded (py), more flexible (Fx), and possessed of more femininity of interests (Fe) than architects in general.

5 What is most impressive about Architects I is the degree to which they have actualized their potentialities. They have become in large measure the persons they were capable of becoming. Since they are not preoccupied with the impression they make on others or the demands that others make on them they are freer than the other two groups to set their own standards and to achieve them in their own fashion.

. . . .

They are perhaps the prototype of the person of strong ego. Confident of themselves and basically self-accepting, they are to an unusual degree able to recognize and give expression to most aspects of inner experience and character and thus are able more fully to be themselves and to realize their ideal (p. 277).

Conclusion to Part II

In this section we have attempted to show that even the most comprehensive of the available creativity theories or models are founded on some questionable theoretical and methodological assumptions. The parallelism among theories that Bloomberg (1973) alludes to has been quite evident throughout. This is in spite of the fact that the three theorists under consideration can all be classified as mainstream and have certain theoretical and methodological commonalities.

Cattell and MacKinnon share a common interest in the creative personality. However, we are unable to compare their research findings except in general terms because of the different assessment measures involved in the two theories, and also because of Cattell's elaborate and highly individual construct of motivation. Another obvious comparison would be between Guilford and Cattell on the basis of their common multivariate method. However, this too we are unable to do except in trivial ways because Cattell's basic constructs are derived from a soft data approach to examining the creative personality. He does this through looking at cultures, personal histories and personality traits, but at the expense of ignoring or overlooking the actual processes involved. Guilford, on the other hand, does the latter but at the cost of keeping to a very narrow research base.

We have to conclude that while all three of these researchers have produced some very promising preliminary research results on the nature of human creativity, it remains for them as for us a poorly understood issue.

PART III

An examination of the main theoretical aspects

of the creativity literature

I know that it is possible to teach children to think creatively and that it can be done in a variety of ways. I have done it. I have seen my wife do it; I have seen other excellent teachers do it. I have seen children who had seemed previously to be 'non-thinkers' learn to think creatively, and I have seen them continuing for years thereafter to think creatively.

(Torrance, 1972)

We do not need to be taught to think. In fact thinking cannot be taught. The function of education is rather to show us how not to interfere with the thinking capacity which is inherent in the human mind.

. . . .

. . . thinking and learning are not performed consciously. Let us not minimize the importance of this fact, which challenges all traditional approaches to teaching. . . .

(Kubie, 1965)

Introduction to Part III

In this section we will examine some common themes in the creativity literature, those which we believe to have been the most significant and the most promising to have emerged since 1950.

The investigations carried out in Part III are not meant to be a historical survey of the literature, although they are meant to embrace it in its main theoretical aspects. Again what we hope to do is to point out certain assumptions which have oriented and constrained the literature, as well as certain relationships between these various themes which have not been recognized because of those assumptions.

The usefulness of this exercise, we believe, will be in pointing towards certain ways in which future researchers might be able to go beyond the assumptions.

Chapter VII

Old Theories and Meta-Theories

In 1975, when the present project was undertaken, all the creativity listings in the indices of Psychological Abstracts, about 3500 at that time, were checked.[1] Then 1184 of the corresponding abstracts were reproduced and catalogued. These were chosen on several grounds, none of which were particularly scientific:

1. personal interest
2. general significance (of the author or the article)
3. oddity
4. representativeness (of an aspect of the literature)
5. at random (when reproduced in conjunction with selected articles.

The selected abstracts were then organized into approximately 60 different categories.[2] On the basis of this we assumed that the material was sufficiently diverse, despite or because of its haphazard method of collection, to provide a reasonably complete indication of the directions the creativity literature had taken since 1950.

From our exercise of cataloguing the abstracts we were able to draw two tentative conclusions about the main directions of modern creativity research:

1. The bulk of the literature did not have an independent theoretical base but was, instead, concerned with methodological

refinements, pedagogical elaborations or practical applications of an existing model of creativity.

2. The conceptual differences in existing creativity theory paralleled the tripartite split in general psychological theory.

On the basis of these observations we decided to limit our examination of the contemporary creativity literature in the following ways:

1. We would concentrate as exclusively as possible on theory.

2. In our study of primary contributions to the literature we would concentrate on the period from 1950 to 1975.

While we recognized the need to adopt a restricted time frame in order to keep the study manageable we also realized that our choice of dates, as has been the case for many other creativity researchers, had been influenced by Guilford's (1950) dismissal of the earlier literature.

> Of approximately 121,000 titles listed (in Psychological Abstracts) in the past 23 years, only 186 were indexed as definitely bearing on the subject of creativity. The topics under which such references are listed include creativity, imagination, originality, thinking, and tests in these areas.
>
> . . . .
>
> Few of these advance our understanding or control of creative activity very much (p. 445).

In the interests of straining out our own assumptions and biases it seemed to us that the pre-Guilford body of creativity literature in psychology must be the subject of at least a perfunctory examination. This proved much easier to carry out in 1975 than it was in 1949 when Guilford and company did it because Psychological Abstracts now has a Cumulated Subject Index for the period from 1927 to 1960 and we were surprised at the wealth of material we found for the pre-1950

period.

It seems to us that an awareness of the directions of this early body of research is quite important for understanding the directions of modern creativity theory. In the perspective of hindsight, it can now be seen that the main outlines for research were laid down during this early period and that the present period has been, to a large extent, but a working through of some of the insights generated in the earlier one. To demonstrate this point we have prepared an annotated bibliography of abstracts drawn from this period. Our purpose is to show the diversity and depth of the pre-Guilford contributions and abstracts have been chosen accordingly. Actual bibliographical data and quotations from the abstracts included for their explanatory value are indented and single spaced. Our editorial remarks are presented in the usual double spaced text form. Where the entry is self-explanatory no comment is given.

Selected Annotated Bibliography of the pre-Guilford period

1920 - 1950

1 Simpson, R. M. Creative imagination. Amer. J. Psych. 1922, 33, 234-243.

Simpson first isolated the creativity factors of fluency, flexibility and originality which were later adopted by Guilford. He also developed a creativity test for children consisting of 50 sets of 4 small round dots as the stimuli for drawings, and he devised a creativity quotient in terms of which individual creativity could be assessed, anticipating Guilford's assumption of creativity as a continuous trait.

2 Alexander, S. The creative process in the artist's mind. Brit. J. Psych., 1927, 17, 305-321.

This is an early process rather than product view of creativity.

3 Osborn, H. Creative education in the school. School and Soc., 1927, 25, 55-60.

The need for creative teaching is emphasized.

4 Walder, R. Schizophrenic and creative thinking. Int. J. Psychoanal., 1926, 7, 367-376.

An attempt to show how variations in experience, desire, ego-ideal and the sense of the ego boundaries determine normal, creative, obsessive and delusional thoughts.

5 Rockwell, J. G. Genius and the IQ. Psychol. Rev., 1927, 34, 377-384.

Although the IQ concept may be limited as the Stanford Group has done, calling a high IQ genius, nevertheless a high IQ does not necessarily mean high creative productivity. The highest achievements require a further quality which the intelligence tests seem to miss. Adult creativeness is the result of intellectual mobilization, which, if not emotionally driven, is at least facilitated by feeling.

An examination of the intelligence-creativity distinction is suggested.

6 Spearman, C. Creative mind. New York: Appleton, 1931.

Spearman's viewpoint is basically an associationist one which holds that mental creativity depends upon

The ability of the mind to create new content by the transposing of an old relation (educing correlates). . . .

7 Montmasson, J. Savoir se reposer pour créer. (Knowing how to rest in order to create.) Psychol. et vie, 1932, 6, 41-42.

The relationship between creativity and passivity/receptivity is hypothesized.

8 Luzzatto, G.L. 10 dialoghi su la creazione artistica. (10 dialogues on artistic creativity.) Lanciano: 1932. Pp. 230.

In these dialogues the author reveals his theory of artistic creation as deriving from a moment of fantasy life, from which proceed realization and execution.

9 White, R.K. The measurement of scientific creativeness. Psychol. Bull., 1933, 30, 715-716.

10 Hutchinson, E.D. Materials for the study of creative thinking. Psychol. Bull., 28, 1931, 392-410.

This is an annotated creativity bibliography in which the author comments on the lack of psychological research in the area of creative thought or productive thought and lists 152 sources from other disciplines such as philosophy and literary criticism to give psychologists a background from which to begin working on this neglected research front. Guilford (1950) cites this study in his bibliography.

11 Hinrichsen, O. (Production and neurosis). Zsch. f. d. ges. Neur. u. Psychiat., 1932, 142, 712-719.

A brief discussion of the relations between literary production and neurosis, with references to well-known writers and to some modern cases.

12 Bahle, J. Einfall und Inspiration im musikalischen Schaffen. (Association and inspiration in musical creation). Arch. des. Psychol., 1934, 90, 495-503.

Eight selected poems were sent to 30 recognized composers with the request that they set one of them to music and write a detailed account of the creative process. 26 of the 30 composers cooperated. This paper deals only with an analysis of the reports with respect to the role of 'sudden ideas' (Einfalle) and inspiration.

13 Lehman, H. C. The creative years in science and literature. Sci. Mon., N. Y., 1936, 43, 151-162.

A study of the most creative years for chemists reveals a greater productivity at early age levels (30-39 years) with a fairly rapid decline in contributions thereafter.

This was the first of many articles on creativity and age by Lehman,

spanning several decades, in which he has methodically examined the relationship of these two variables in many different fields.

14 Kranz, H.W. & Koller, S. Die Umweltbedingtheit beruflicher Fruchbarkeitsunterschiede. (Differences in vocational productivity as conditioned by environment). Arch. Bevolt Wiss. Bevolk-Polit, 1938, 8, 84-103.

This is an early article on promoting creativity in industry.

15 Griswold, F.H. Creative power, the phenomenon of inspiration: An inquiry into the practical methods used by men of genius in developing original ideas. Philadelphia: McKay, 1939.

This is a discussion of synectics (brain-storming).

16 Harms, E. A test for types of formal creativity. Psychol. Bull., 1939, 36, 526-527.

17. Takesaki, S. (Observations on the creations of the mentally ill) Tokio Z. Psychoanal., 1939, 7, Nos. 9/10, 11/12.

18 Zissulescu, S. Psihologia fantaziei creatoare. (The psychology of creative imagination.) Anal. Psihol., 1939, 6, 38-111.

This research based on numerous experiments, including the Wartegg test, attempts to determine the character and types of imagination. The internal processes of imagination develop in accordance with 3 determining factors: Intellect, affect and unconscious factors.

19 McCloy, W. Creative imagination in children and adults. Psychol. Monogr., 1939, 51, 5, 88-102.
The aim of this study was to investigate the creative process apart from technical skill and other complicating factors. By means of a creative composition apparatus, 'permitting the subject to manipulate colors and movable accessories involving the play of colored light upon clay forms and the introduction of backgrounds, active creative imagination in children and adults was studied. The apparatus eliminates or reduces the factors of training, technical ability, special interests and fatigue.'

20 McCloy, W. & Meier, N. C. Re-creative imagination. Psychol. Monogr., 1939, 51, 5, 108-116.
This study investigates the question'whether the student taking art is more adept in the use of and can better interpret symbols having social reference than the student not taking art courses'.

21 Meinecke, G. Herkunftsbeziehungen des Schopferischen. (The origins of creative activity.) Z. Psychol., 1939, 146, 69-160.

An attempt is made to understand creative work in the light of the basic thought processes.

22 Happich, C. Bildbewusstsein und schopferische Situation. (Image consciousness and creative situation.) Dtsch. med. Wschr., 1939, 65, Teil 1, 68-71.

The manner in which Kekulé arrived at the conception of the benzene ring is typical of intuitive production. With the recession of thought and calculation the state of meditation commences. This may pass over into sleep. Affectively toned sense impressions persist longest, continue to operate, and produce the 'image' or solution.

The relation of primary process thinking to creativity is explored and a line of thought very similar to Kubie's description of the function of the preconscious in creative production is advanced.

23 Conrad-Martius, H. Schopfung und Zeugung. (Creation and production.) Tijdschr. Phil., 1939, 1, 801-826.

Creative achievements involve two factors: the subjective creation within the individual, and the materialization of that creation through which it passes from existential nothingness to existential reality. In his products, the individual multiplies and expresses himself without effecting a new creation.

This is an anticipation of Maslow's distinction between self-actualization creativity and special product creativity.

24 Hinrichsen, O. (Remarks on the creative power of the unconscious). Psychiat.-neurol. Wschr., 1939, 41, 28-32.

25 Sisson, E. D. & Sisson, B. Introversion and the aesthetic attitude. J. gen. Psychol., 1940, 22, 203-208. (In a sample of college students, introverts rated higher than extroverts on the Allport-Vernon study-of-values aesthetic key.)

This is an anticipation of Cattell's connection between introversion and creativity.

26 Hutchinson, E. D. The period of frustration in creative endeavor. Psychiatry, 1940, 3, 351-359.

The author discusses

> the period of renunciation or recession during which the problem of creative endeavor is temporarily abandoned for other activities, as a defense against the emotions involved.

In an anticipation of Crutchfield (1964), he also discusses the "common mistake" of assuming social uncoventionality is related to creativity.

27 McDonell, M. S. & Howe, S. R. Creative use of play materials by preschool children. Childh. Educ., 1941, 17, 321-326.

Research instruments for testing this have been designed by Starkweather (1971).

28 Rees, H. E. A psychology of artistic creation as evidenced in autobiographical statements of artists. New York: Bureau of Publications, Teacher's College, Columbia U., 1942.

29 Munro, T. Creative ability in art and its educational fostering. Yearb. Nat. Soc. Stud. Educ., 1941, 40, 289-322.

In attempting to produce well adjusted personalities and to help children achieve optimal educational progress, educators may unwittingly cripple the development of potential creative artistic ability.

30 Harding, R.E.M. An anatomy of inspiration. Cambridge: Heffer and Sons, 1942.

This book contains a great deal of data on the origin of creative thought and imagination and shows what are the predisposing conditions for their development and functioning.

31 Hademard, J. The psychology of invention in the mathematical field. Princeton, N. J.: Princeton University Press, 1945.

This book presents a rational analysis of the creative thinking processes, with special reference to mathematical discovery.

32 Bergson, Henri. The creative mind (trans.) New York: Philosophical Library, ((1934), 1945)

Along side man's capacity for rational thought exists a capacity for intuition which Bergson defines as 'instinct which has become disinterested, self-conscious, capable of reflecting upon its object and of enlarging it indefinitely.' Bergson was not concerned with creativity as a separate category because he considered it to be virtually man's defining characteristic. Therefore his other attributes should be defined in terms of it rather than attempting to delineate his creative aspect. The English title is misleading.

33 Roe, Anne Alcohol and creative work. Pt. 1, Painters. Quart. J. Stud. Alcohol, 1946, 6, 415-467.

This is a study of the personality and work habits of 20 outstanding artists in terms of their alcohol consumption. It was the first of a series of studies of eminent creatives in various fields that Roe did. She had a psychoanalytic orientation and used the biographical method. MacKinnon's work owes much to her and has carried on her analysis of the creative personality.

34 Hulbeck, Charles. The creative personality. Amer. J. Psychoanal., 1945, 5, 49-58.

It is suggested that our cultural trend is against creativeness despite efforts to promote it.

This is an anticipation of Clifford's (1964) study of the role of the creative in American society, where she reached the same conclusion.

35 Wertheimer, Max. Productive thinking. York and London: Harper, 1945.

Wertheimer's central argument is that creative problem solving involves reorganization of the perceptual field . It is necessarily preceded by the recognition of a gap in the perceptual field and the moment of resolution cannot be predicted.

36 Armstrong, E. Shakespeare's imagination. London: Lindsay Drummond Ltd., 1946.

One method of seeking an understanding of creative imagination is to study in detail the works of a great poet or artist and to study in particular the imaginative

detail which goes to construct these works. Armstrong examines the bird and insect imagery of Shakespeare. . . . Truly imaginative construction differs from phantasy, which though proceeding from the same levels, is dominated by wish fulfillment: it is detached from the particular emotions and personal experiences of the poet.

37 Welch, L. Recombination of ideas in creative thinking. J. appl. Psychol., 1946, 30, 638-643.

Reorganization and recombination of ideas is accepted by this author as basic to all forms of creative thinking.

Welch is expounding the view that creativity is basically association of ideas and he used measures of fluency, flexibility and originality to test this hypothesis.

This bibliography is far from complete[3] but it does give some indication of the range of the pre-Guilford literature. From the perspective it provides we were able to draw the following conclusions with reference to this body of material:

1. Guilford is correct in his suggestion that very few of these studies employ operationalizable concepts of creativity.[4] (The exceptions appear to be Simpson, 1922; White, 1933; Harms, 1939; Wertheimer, 1945).

2. The main conceptual divisions in this body of literature, with its contributions largely drawn from literary, psychoanalytic and the few, more strictly empirical sources, roughly parallel those already indicated for modern creativity theory and psychology in general.

Analysis of Schemata

With the above points in mind, we turn now to an analysis of six schemata of post-Guilford creativity literature, reproduced here in the order of their original publication (1963 to 1975).

A Golann ((1963), 1973)

1. Product
2 Process
3 Measurement
  a factor analytic
  b criterion group empirical
4 Personality
  a motivation
    i. self-actualization
    ii psychoanalytic
  b personality attributes

B Mackler and Shontz (1965)

1 Psychoanalytic
2 Associationistic
3 Gestalt
4 Existential
5 Interpersonal
6 Trait

C Gowan (1972)

1 Cognitive, rational and semantic
2 Personal and environmental
3 Mental health and openness
4 Freudian and neo-Freudian
5 Psychedelic

D Bloomberg (1973)

1 Psychoanalytic
2 Humanistic
3 Environmental
4 Associative
5 Factorial
6 Cognitive-Developmental
7 Holistic

E Rosner and Abt (1974)

1 Aesthetic
2 Cognitive
3 Developmental
4 Humanistic
5 Philosophical
6 Psychoanalytic

F Taylor (1975)

1 Psychoanalytic
2 Humanistic
3 Trait-Factorial
4 Holistic
5 Associationistic

Table 9

Comparison of Six Creativity Schemata

An initial examination of the schemata presented in Table 9 suggests that the later ones employ more generalized categories than the earlier ones. However, on closer inspection, we can observe that the apparent uniformity and generality of these categories in the last three schemata are due more to syntactics than semantics. The categories appear to be parallel but they are not. Theory and method remain confused throughout the entire six schemata. Terms like trait and factorial, which refer to particular methodological approaches, are placed side by side with terms like holistic and humanistic, which refer to basic philosophical positions, and with terms like psychoanalytic and associationistic, which refer to general psychological theories.

The only categories which seem to be consistently represented throughout the six schemata are psychoanalytic (A-4aii, B-1, C-4, D-1, E-6 and F-1) and humanistic (A-4ai, B-4 and B-5, C-3, D-2, E-4 and F-2). In our opinion, these categories of psychoanalytic and humanistic have two characteristics in common. They are both concerned with the question of human motivation in creativity, as Golann ((1963), 1973) has suggested, and they are both non-mainstream approaches to creativity research.

We believe that the remainder of the categories presented in the schemata are, for the most part, representative of particular research biases rather than general theoretical orientations.[5] As such, a further analysis of them would be a fruitless exercise from our point of view. Instead we will discuss them in terms of three general theoretical positions in psychology which seem to us to encompass most

of the modern mainstream creativity literature: associationism, Gestalt theory [6], and information-processing theory. We are not suggesting that all the major creativity researches are subsumable under only one or another of these categories but rather that, between the three, the mainstream literature in terms of its particular theoretical orientations can be largely accounted for. The conceptual basis for Guilford's model, for example, incorporates elements from all three of these theoretical positions, as will become clear in the next chapter.

We believe that the distinction between mainstream and non-mainstream approaches to creativity theory, which has emerged from our analysis of the schemata and our consideration of the pre-Guilford literature, is a most important one and the discussion of the literature in the next two chapters will be carried out in terms of this basic division.

Notes - Chapter VII

1 At that time volume indices were only available up to the end of 1974. As later Abstracts became available they were checked to allow for inclusion in our study all articles published up to the end of 1975.

Psychological Abstracts was first published in 1927 and it does not take much account of research published before 1920. It might be noted that the term, creativity, appears as an index heading in this publication for the first time in 1933 and is only used intermittently until 1949. From then on it is used consistently but still in conjunction with such alternate terms as creativeness, creative thinking, and creation. It is not used exclusively until the early 1950's, after Guilford's 1950 article had made its impact.

2 See Appendix A.

3 One notable omission is the early psychoanalytic literature on creativity which will be considered in Chapter IX.

4 Because of its central importance to the history of modern creativity literature, we will mention again the role Guilford played by introducing an operationalizable concept of creativity as a continuous trait, normally distributed throughout the population and comparable to but not identical with intelligence (i.e. what conventional intelligence tests measure). As Albert (1969; 1975) has pointed out, before Guilford popularized creativity, genius was the term in general use and this has historically connoted discontinuity, i.e. an exceptional, qualitatively different form of intelligence. This meant it was unamenable to empirically based psychological study. because of the lack of a general basis for comparison. Under Guilford's influence, creativity has come to connote continuity and measurability, a tangible state of being instead of ineffable process. It is that which lies behind the enthusiasm of mainstream North American psychologists in tackling the creativity problem. It does not seem too much to say that they appear to have gone to the other extreme from the view of genius as incomprehensible by hypostasizing the creative act.

We should point out that Terman's work on genius (beginning in 1925) is an exception in that, following Galton (1870) he believed all intelligence to be continuous, normally distributed and hereditary, although he recognized that he was dealing with a far less exceptional sample than Galton.

5 We take this as substantiation for Kuhn's (1963) point that psychology does not yet have a clear paradigm. If it did, such category confusion could not exist.

6 As opposed to Gestalttheorie , which term we will reserve for discussions of the early period in the history of Gestalt.

CHAPTER VIII

An Exploration of Modern Mainstream Creativity Theory

We have taken the position that the bulk of modern mainstream creativity theory can be interpreted in terms of the associationist, Gestalt and information-processing frameworks. If this position is demonstrated to be correct it will have as its corollary that creativity is nothing more than thinking in its most efficient form. To explore this possibility we will first examine the places of modern Gestalt theory and associationism in creativity research. We will then discuss the strange, ubiquitous role of information processing theory.

Gestalt theory

Throughout their history, Gestalt psychologists have consistently stressed the integrity of relationships and the special human ability to perceive these relationships as something more than the sum of their independent, additive parts. Their approach to psychology has been characterized by an attempt to deal with these relationships in a rigorously empirical but non-reductionist manner.

The basic contribution the Gestalt school has made to creativity theory is through its concept of insight, perceptual shifts - sudden, inexplicable reorganizations of the perceptual field. In the last major lecture he gave before he died, Kohler ((1966), 1972)

described his much altered views on insight as follows.

> Convincing proof that the essential change (insight) tends to occur outside the mental field, and that only the result appears on the mental stage - such proof is supplied by ever-repeated observations of men who have solved really important problems in science. They all agree on one point. After periods during which one has actively tried to solve a problem, but has not succeeded, the sudden right organization of the situation, and with it the solution, tend to occur at moments of extreme mental passivity (p. 160).

Kohler is talking about a process that takes place in the unconscious or preconscious although he might not have wanted to use those terms. His description has elements in it which are reminiscent of Kris' concept of regression in the service of the ego. We also believe that it is not necessarily incompatible with association theory. Even if the recombination of elements is believed to be a purely random activity, the new combination must be perceived holistically if its appropriateness in the particular context is to be recognized.

The original Gestalttheorists, however, rarely used the term creativity. They talked instead of productive thinking, meaning the kind of thinking that is useful in solving problems. In his book of that name, Wertheimer (1945) argued that thinking involves dealing with the gaps in a problem, i.e. seeking the inner structural relations among the various parts of the problem and the whole. Doing this requires an ability to see relationships which the Gestalttheorists considered to be a function of intelligence.

Kohler ((1966), 1972) gives an example of the kind of relations required for productive or insightful thinking in chimpanzees, drawn from his field studies in Africa. Sultan learned to place a box under

a banana suspended from the wire roof of his cage in order to reach it. Rana was unable to do this even though she observed Sultan's behavior many times. She would move the box around the cage, jump from the top of the box and jump from the floor under the banana but she never moved the box under the banana in order to jump from there. Kohler speculated that she was not able to make the relationship of putting the box under the banana to reduce the jumping distance.

Behaviors involved in problem solving, such as this one, became the focus of examination for the next generation of Gestalt psychologists, and the resulting studies laid much of the groundwork for the more recent studies in cognitive style. Researchers like Maier (1931), Duncker(1945) and Luchins and Luchins (1950) worked out the basic relationships involved in restructuring problem situations. In his classic pendulum experiment, Maier divided his subjects into three groups according to whether or not, and with or without the help of hints, they were able to grasp the relationship between swinging two ropes to bring them into proximity and using an available pair of pliers as a pendulum. Wertheimer's student, Duncker, worked out the mental steps in the tumour irradiation problem for which the solution was irradiating from many angles with weak rays to create a hot spot in the tumour center.[1] Luchins and Luchins examined the problem of Einstellung, mental set, in their classic water jar problems, some of which involved addition of fluid while others involved subtraction.

What all these problems have in common is that they cannot be approached sequentially, i.e. in a logical step by step manner. Maier has distinguished between productive thinking, in which past experience is repatterned and restructured to meet current demands,

and reproductive thinking, which is closely related to transfer of training. It is clearly the former process that is involved in these examples. The question is: Can productive thinking be equated with creative thinking? In attempting to answer this question we must consider what the term, creative thinking, has come to connote in recent times.

Modern creativity researchers who have wished to emphasize process rather than product have talked in terms of creative thinking rather than creativity or creative potential. This has been useful in that it has allowed them to emphasize the act of thought, rather than the result, i.e. the moment of insight. However, in another sense, it has been unfortunate because it has tended to produce a dichotomy between thinking and creative thinking which, we believe, reflects the deeper schism between creation and destruction. The distinction implied is between the critical and the creative processes of thought.[2]

Within the terms of this distinction, scholarship would be an example of critical thinking, in fact, the quintessence of it.[3] This is because it is concerned with an analysis of what already exists rather than with a synthesis of something new.[4] Yet surely, in the scholar's exercise of reducing his material to its basic elements, of causing old orders to crumble so that new ones may be built up, there is something of the creative process, even if he must leave it to another to do the actual reconstruction?

The Gestalt theorists saw the recognition of a problem, i.e. challenging the order of the perceptual field, to be as important a part of productive thinking as the finding of a solution, i.e. reorganizing the perceptual field. Einstein's theory of relativity

seems to have originated through such a process. It was through his analytical power that he was able to break free of the prevailing definitions of space, time and light. By reducing elaborate mental constructs to their constituent parts he was able to relativize certain absolutes and to absolutize certain relatives in the classical theory of space-time, thus revolutionizing it.

Through Gestalt theory, then, comes a line of thought which has led to an emphasis on reorganizing the problem area so a solution can be discovered. By contrast, the legacy of association theory has been an emphasis on mental recombination of sensory input so that occasionally something new and useful can be generated.

Modern association theory

The modern associationist approach to creativity is best known by psychologists through the work of Sarnus Mednick on his Remote Associates Test. However, as already discussed, the psychological study of cognition in general was largely associationistic until the late 19th century. Therefore, when some psychologists began to turn their interests specifically towards creativity at the turn of this century, the natural direction for them to take was associationism. [5]

Ribot (1900), in his work on the associative basis of imagination, argued that it is association by resemblance, either mediated or direct, that is the basis for analogical, and hence creative, thinking. He believed that association by contiguity merely reproduces the environment and makes for stereotypy rather than creativeness.

Mednick's theory of the associative basis of creativity is, in

some ways, not as sophisticated as Ribot's or certain others we might mention[6] but what gives it its unique importance for modern creativity research is its operationalizability. The conceptual framework in which Mednick grounded his Remote Associates Test (RAT) is quite simple and straightforward. He began (1962) by defining creativity in terms of novelty and social usefulness as

> . . . the forming of associative elements into new combinations which either meet specified requirements or are in some way useful. The more mutually remote the elements of the new combination, the more creative the process or solution (p. 220).

He equates the capacity to combine "remote elements" with originality and then operationalizes this concept in a remarkably simple manner.

> The originality of a response is simply inversely related to its probability in a given population (p. 221).

Mednick's explanation of how new combinations appear borrows much from traditional association theory but his interpretation of original differences seems to be original. He recognizes three environmental facilitators of the associative process which he refers to as serendipity, similarity and mediation. The first two basically correspond to the classical association categories of contiguity and resemblance. He suggests that similarity may work as a creative spur through primary stimulus generalization. The third, mediation, refers to the creative conjunction of two very different ideas through their common association with a third idea, e.g. "the lion's ferocious chrysanthemum head".[7]

To explain individual differences in association Mednick[8] developed the concept of an associative hierarchy. He postulated that creative individuals will have a rather flat gradient of response to

stimuli while normals will have a steep one. His reasoning was that once the first few stereotyped responses to a stimulus have been given a normal person's response level will drop off sharply while, in a creative, stereotyped responses will not be overly dominant and he will therefore be more likely to reach the more remote associations in his response repertoire.

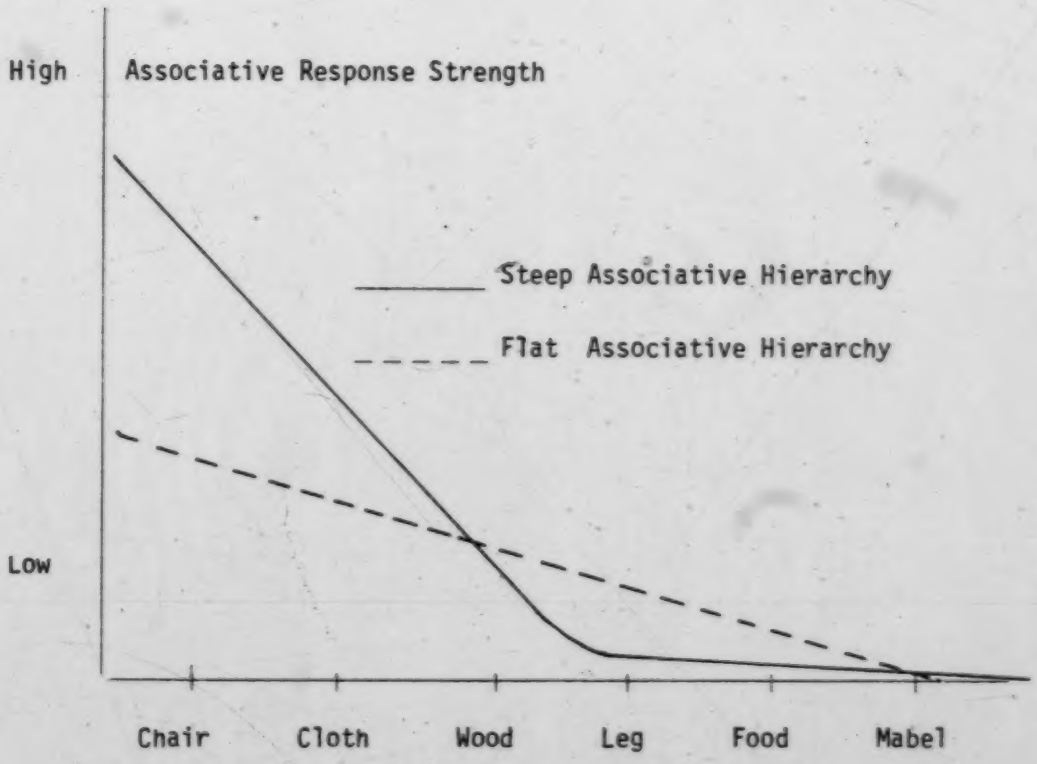


Figure 3

Associative hierarchies around the word, table

(Mednick, 1962, p. 223)

Mednick was able to use his associative hierarchy concept to norm responses to common words, in effect to operationalize originality, at least as it is manifested verbally. On the basis of this he constructed his RAT, a set of 40 three-word items, each to be connected with a common fourth word supplied by E.

e.g. rat blue cottage : cheese.

Initial studies done by Mednick and his coworkers suggested a high correlation between RAT scores of architectural and graduate students and creativity ratings provided by their instructors and supervisors. However, subsequent independent studies were not entirely supportive and, after a great amount of initial enthusiasm, research on the RAT has dropped off substantially in the last decade. Its validity as a measure of creativity is now held very much in question (Bloomberg, 1973, pp. 9-12). Its emphasis on single right answers and on time limitations, its failure to correlate with other well validated measures of creativity such as the Barron-Welsh Art Scale (1952), and its exclusive concern with verbal responses suggest that it is more a measure of verbal intelligence than creativity.

Associationism is one of the main hypothetical constructs on which is based much of the early research in problem solving and computer simulation. It is fundamental to most forms of learning theory as well. Contiguity in time and space allows for the link between Pavlov's conditioned and unconditioned stimuli and provides the basic condition for Thorndike's law of effect. As Humphrey (1951) says

> . . . the conditioned reflex theory is the modern form of the classical theory of association (p. 28).

In talking specifically about the psychology of thinking, however, Humphrey says that its history

> . . . consists largely of a revolt against the doctrine of associationism (p. 128).

This revolt was against the attempt to reduce thinking to a behavior that can be explained in reductionist, stimulus-response terms. With this in mind we must ask if the real argument against the RAT is that it is a measure of intelligence or that it is a measure of only one aspect of intelligence or thinking ability, i.e. analogical reasoning?

The term, thinking, has many popular connotations decidedly peripheral to its basic meaning, which we might tentatively define as problem solving through logical or analogical reasoning. When these extraneous meanings are eliminated what we are left with, according to the Concise Oxford (1944), is

> . . . (to) form conception of. . .
>
> . . . .
>
> exercise the mind otherwise than by passive reception of another's ideas (p. 1274).

It is our opinion that if the modern psychological concept of thinking had not been impoverished by reducing it to those aspects which are operationalizable, it would not be necessary to contrast it with creative thinking. We believe that thinking, in its most efficient sense, is creative thinking because it consists of forming associations by analogical reasoning (simultaneous processing?) and drawing connections through logical reasoning (successive processing?) both on the basis of holistically perceived sensory or mental phenomena.[9] To demonstrate this we now turn to a consideration of what Bolles (1975) refers to as the new paradigm in psychology - information processing theory based on the computer analogue.

Information processing theory

The modern movement of cognitive psychologists towards an information processing model can be traced back to the revolt against naive behaviorism brought about through the purposivism of McDougall and Tolman, already mentioned. Cognitive psychology has taken seriously the Gestalt tenet of holism but has not been willing to give up the associationist framework entirely. It has compromised by introducing intervening variables into stimulus-response connections. Thus, S-R bonds have become S-I-R bonds, the tautological nature of which is only now becoming evident.

In his often mentioned presidential address to the American Psychological Association in 1960, Donald Hebb (1964) acknowledged the S-R basis of cognitive psychology.

> . . . the whole meaning of the term cognitive depends on it, though cognitive psychologists seem unaware of the fact. The term is not a good one, but it does have meaning as a reference to features of behavior that do not fit the S-R formula; and no other meaning at all as far as one can discover (p. 4).

The basic distinction Hebb was making in this address was between sense-dominated behavior, which can be adequately explained in S-R terms, and a broad spectrum of behavior which is not sense dominated and which, historically, has been explained in mentalistic terms. But as Hebb says

> 'mind' and 'consciousness' are useful as loose designations of the complex interaction of mediating processes in the intact, waking higher animal; 'cognitive processes' would do also, but is it any improvement (p. 6)?

Cognitive psychology may be called mentalistic, or idealistic in the philosophical sense, because it suggests a model of man that is

active and purposeful. He is not reactive in Freud's closed system 'steam-engine' sense, or passive in the primitive Hobbsian associationist sense that characterizes naive behaviorism. However, the causality of this activity has not yet been worked out by cognitive theorists.

Under the general category of cognitive psychology it is possible to distinguish several sub-categories on the basis of the analogy they use in describing this inner activity. As Kirby says (1973), such metaphors are necessary because of the hidden nature of these inner processes. One example is Hebb's cell-assembly and phase sequence theory which makes use of a physiological metaphor. A far more commonly used metaphor, however, is that of information processing.

In information processing theory the human being is seen as a system bombarded by sensory stimulation of which only a portion is absorbed and integrated. The implied selectivity suggests an active, independent nature to thought. As Kirby says (1973)

> . . . to talk of processing information is to imply that there are internal processes which are to some extent stimulus-independent (i.e. semi-autonomous) (p. 4).

The language of information theory, terms such as input and output, processing, storing and coding, search and retrieval, plan and meta-plan, has become so much a part of the language of modern cognitive psychology that a clear-cut differentiation between the two is no longer possible. However, it is necessary to recognize that the development of information processing theory has two very different sources. The older of these is cybernetics, the science of control mechanisms and their communications systems (Chaplin, 1975, p. 128). This is a highly atomistic approach which fits well within a basic

associationist framework. In recent years, however, with the advent and increasing sophistication of digital computers, the older, atomistic model is gradually being replaced by a far more complex, holistic model. It is in this context that computers are being looked at as simulaters which are designed in the mental likeness of man (Hovland (1960), 1964) (Hunt, 1971). To explore the potential of an information processing explanation of creativity we will examine examples of both the older and newer models.

Guilford's information processing model.[10] Guilford was impressed by the similarities between steps of the creative process:[11] preparation, incubation, illumination and verification, proposed by Wallas (1926) in the The art of thinking, and the steps of basic problem solving models. He suggested (Guilford, 1966) that the main difference between the creative process and the ordinary problem solving process was in the presence of the incubation stage in the former.

Guilford explains the difference between the ordinary problem solver and the creative problem solver by reference to a looping phenomenon, a concept he borrows from cybernetics. As can be seen from an examination of figure 5, looping refers to the rerouting of information back to earlier points of transmission. Guilford diagrams four of these cyclical patterns on the chart. Interpreted in terms of his SI model we can see that they all involve intercommunication between the five operations (memory, cognition, convergence, divergence and evaluation) and that finally all the loops come to depend on the evaluation operation.

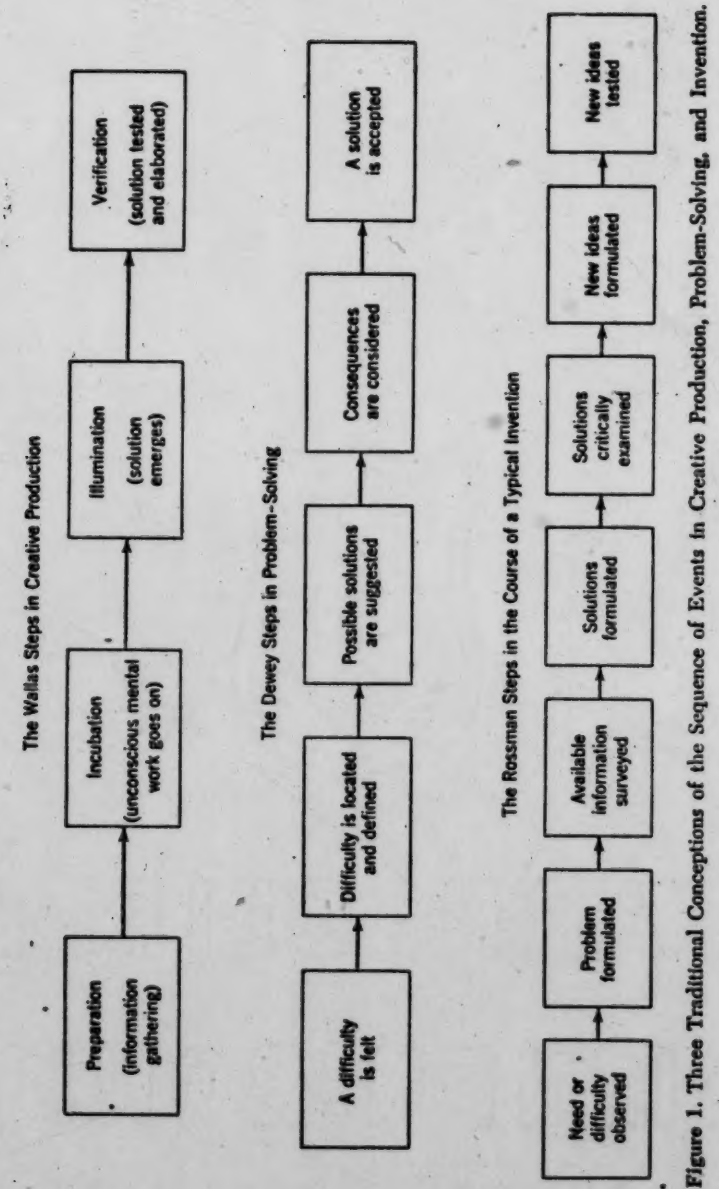
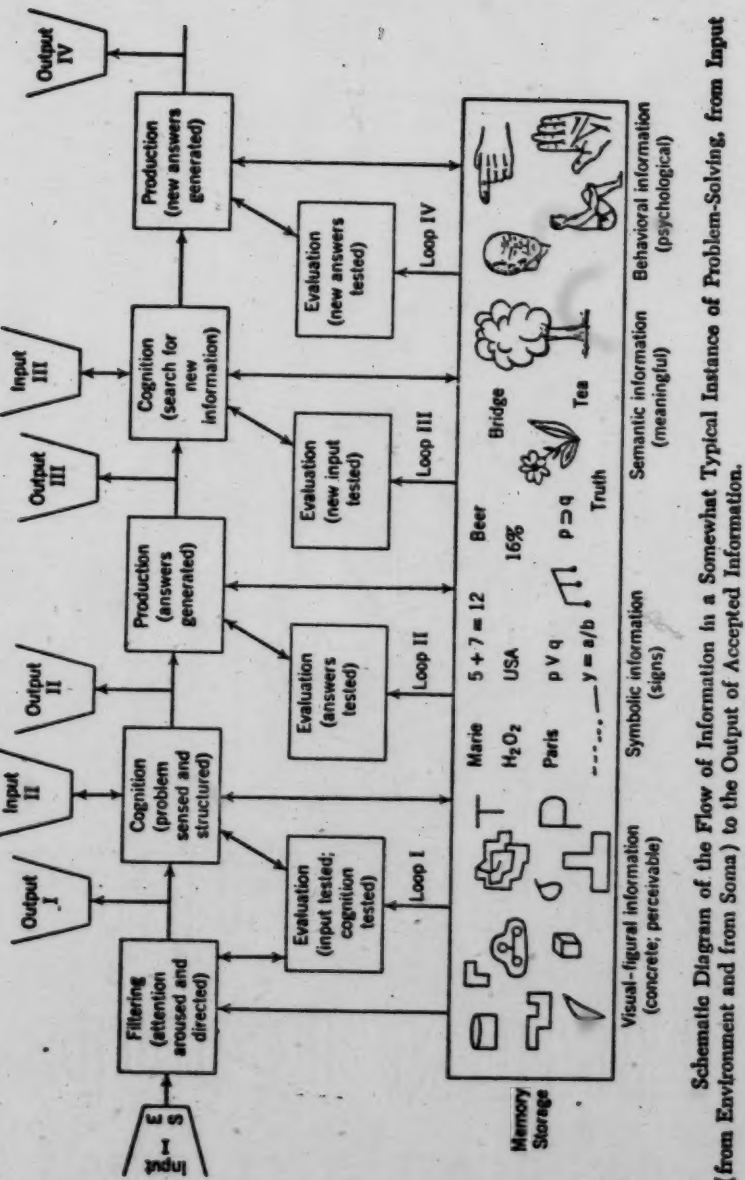

The Wallas Steps in Creative Production
Preparation (information gathering)
Incubation (unconscious mental work goes on)
Illumination (solution emerges)
Verification (solution tested and elaborated)
The Dewey Steps in Problem-Solving
A difficulty is felt
Difficulty is located and defined
Possible solutions are suggested
Consequences are considered
A solution is accepted
The Rossman Steps in the Course of a Typical Invention
Need or difficulty observed
Problem formulated
Available information surveyed
Solutions formulated
Solutions critically examined
New ideas formulated
New ideas tested

Figure 1. Three Traditional Conceptions of the Sequence of Events in Creative Production, Problem-Solving, and Invention.

Figure 4

Three problem solving models

(Guilford, 1966)



Schematic Diagram of the Flow of Information in a Somewhat Typical Instance of Problem-Solving, from Input (from Environment and from Soma) to the Output of Accepted Information.

Figure 5

Guilford's problem solving model

(Guilford, 1966)

Evaluation can be interpreted as the final verification stage in Wallas' model of the steps in creative production (see figure 4). However, it occurs at a much earlier stage in other problem solving models. On the basis of this, Guilford suggests that one of the important things that distinguishes the creative thinker from the ordinary thinker is the technique of suspending judgment. He translates this suspension of judgment into information processing terms as a bypassing of the evaluative filter, i.e. looping. In this way evaluation is delayed until the incubatory creative activity has taken place. [12]

Computer Simulation Theory

Early computer models. The implications for explaining creativity through computer simulation were pointed out by Miller, Galanter and Pribram ((1960), 1972) in their frequently referred to book, Plans and the structure of behavior.

> The advantages of having Plans to generate Plans is so great that no intelligent automaton, living or dead, could get along without them. They not only permit the electronic computer to seem creative in a trivial way with logarithms, they permit men to be creative in significant ways in a wide variety of situations (p. 292).

Newell, Shaw and Simon ((1958), 1964) and ((1962), 1963) elaborated upon these implications, basing their remarks on two assumptions. The first assumption ((1962), 1963) was that

> . . . creative activity appears simply to be a special class of problem-solving activity characterized by novelty, unconventionality, persistence and difficulty in problem formulation (p. 66).

Their second assumption was that the digital computers they were programming solved problems by using the same search and retrieval

methods as human beings, i.e. the same heuristic techniques[13] (p. 67). Even at that time, their "general problem-solver" had been programming a relatively wide-ranging variety of problems because they had discovered strategies for sequencing heuristics, i.e. metaplans. Some of the problems which computers available then, including theirs, had been programmed to solve were: discovering proofs for mathematical theorems, composing music, designing engineering structures and playing chess. Newell, Shaw and Simon as well as many other psychologists consider these to be creative activities.

However, one of the chief complaints against these early computers was that they could not simulate the active, seeking nature of man and therefore could not adequately account for his complex thinking processes (Radford and Burton, 1974).

> Now a computer does not seek activity - it stores programs until such time as they are required by the input. On the other hand one of the most influential ideas to emerge in recent years is that man is largely intrinsically motivated: he finds inactivity uncomfortable. . . (p. 349).

Radford and Burton go on to suggest that there are computer simulation theorists

> who regard the 'passive' approach (to human cognition) as adequate and claim that satisfactory models can be developed without reference to notions of dynamism, planning and prediction, etc. (p. 351).

They cite an article by Morton and Broadbent (1967), entitled "Passive versus active recognition models, or Is your homunculous really necessary?", as an example of this approach.[14]

Since 1974 tremendous advances have been made in computer hardware and software and criticisms like the above no longer apply

to the same degree. However, a full integration has not occurred in terms of perception in either auditory or visual systems with the software heuristics.

A recent computer model. An example of an active approach to information processing through computer simulation is the model offered by Neisser (1967). His work has been done on visual pattern recognition and his basic assumption is that perception is an active process both in terms of how we recognize and in terms of what we recognize.[15] He uses the term, analysis-by-synthesis, to describe the predictive nature of perception. That is to say, he believes that perceptual recognition is not a matter of examination and categorizing but of predicting what the input is and then matching this predicted input to the corresponding pattern from memory store.[16]

Computer simulation theorists have long recognized the possibility of two different programming approaches to the design of artificial intelligence systems, usually referred to as sequential and parallel. Neisser's active approach to simulating perception is based on the latter, which he calls multiple processing, but he recognizes the necessity of using sequential processing for many research problems. He says ((1963), 1972)

> In any situation where a correct and decisive sequence of operations can be established sequential programming will be very much more efficient (p. 315).

Sequential logic (processing) depends on precise input at every stage. In the case of identifying letters, for example, the computer would not be able to process right angle and go on to the next point in the decision tree, vertical line, if there was any distortion at

all in the angle, such as might occur in the case of hand-printed characters. However, a multiple processing program is not subject to this difficulty because it proceeds (Neisser (1963), 1972)

> . . . by asking all the questions at once, instead of letting each answer determine the next question. Suppose the program examines the input for many different properties simultaneously. Letters are ultimately identified by weighted averages of the results. Such features as vertical line and right angle are given weights which will decide T and decrease its chances of saying O. Even a great deal of variability need not lead the program astray, because letters are effectively defined by the totality of their features (p. 314).

In suggesting that there is a place for both sequential and multiple (parallel) processing in computer programming and asserting that the latter process involves identification of wholes, like whole letters, Neisser is implying a parallel with human thinking. He believes, on the basis of his understanding of the psychoanalytic literature on primary and secondary processes, that thinking is a multiple activity.

> The fundamental assumption on which my argument rests is that people commonly or constantly think about several things at once (pp. 320-321).

But consciousness, itself, is "intrinsically simple", he says. By this he means that we are only aware of one main train of thought, proceeding in an orthodox, step by step fashion, at a time. However, Neisser says, other "multiple processes" are going on simultaneously at a non-conscious level, which may or may not influence the main sequence.

> The multiple operations can combine and influence one another in many ways. In the computer program for letter recogniton discussed above, the processes which

> recognized various features were combined by a simple weighted sum. In human thinking, every sort of fusion, exclusion, disjunction, and so on may occur. The result of this facile interaction is the 'primary process' described by Freud, in which condensation, compromise, and disregard for logic are the rule.

Neisser is drawing a parallel between multiple and sequential processing in computers and simultaneous and successive reasoning in human thought. And in claiming that problem solving is dependent on sequential logic, and therefore a conscious process, he is distinguishing it from creative thinking (Neisser (1963), 1972).

> Problem solving, no matter how elegant, always involves mostly a response to environmental demands, while creativity erupts more or less constrainedly from within the person himself (p. 308).
>
> . . . .
>
> It is generally agreed that the creative process is not a conscious one (p. 308).
>
> . . . .
>
> At times when the activity of the main sequence is not demanding - for example, during sleep or the performance of routine activity - other sequences, out of consciousness, may attain high degrees of complexity. As we have seen, such states of disengagement do seem to play a critical role in creative thinking. Thus, considerations of capacity explain the role of the 'incubation' phase of thought.(p. 319).

Conclusion

Several questions remain unanswered in the light of Neisser's very suggestive article. Is creative thinking really distinct from sequential thinking, including problem solving, or is the latter only the conscious articulation of what has already been worked out in the preconscious? It seems to us that Gestalt theory, association theory and computer simulation theory are all fragmented descriptions of a basic overall process of thinking. We believe that the question of why some people appear to think more creatively than others will only

be resolved through developing a more complete understanding of the psychodynamic structure of the individual.

Neisser refers several times to the important role of motivation in cognition but that, as yet, cannot be handled within the context of computer simulation theory.[17] At the present time, the question of human motivation is dealt with most ably in the context of psychoanalysis and to a lesser extent in self-actualization theory. The next chapter will consider the creativity question within this context.

Notes - Chapter VIII

1 One wonders if the person who resolved this problem did not draw a Mednick-like association between radius and radiation!

2 According to Thomson (1964), L.L. Thurstone once claimed that all students can be categorized as either analytical thinkers who tend to be narrow and critical or creative thinkers who tend to be open and gullible. As an afterthought he added that the former often make great scholars.

3 Scholarship, apparently, is not considered to be creative by psychologists. In surveying the literature on creativity we happened upon articles about drugs, divorce, business, basket-weaving, and many other strange subjects which seem far removed from creativity, but never one on scholarship.

4 Since process theorists, Bruner (1961) for example, seem to be as committed to the novelty criterion of creativity as product theorists, they also do not consider scholarship creative.

5 Reeves (1966) comments that Alfred Binet, in his early phase, attempted to define creativity in terms of associationism but later moved away from that framework.

6 See, for example Arthur Koestler's (1964) discussion of bisociation, pp. 642-660. He realizes, as do most modern psychologists with the exception of Mednick and certain learning theorists, that classical association theory is of limited use in modern theory building because of its reductionist nature. He argues that since

> . . . the principles underlying associative thinking are determined by the matrix in which the thinking takes place . . . there are as many types of association as there are codes which control verbal behavior.

He therefore defines associative thinking as the exercise of a habit as distinct from learning, the acquisition of a new skill, and he distinguishes this from bisociation, the ". . . combination, re-shuffling and re-structuring of skills". The ultimate distinction he is leading towards is between habit and originality He sees association as habit, i.e. as occurring within the confines of a given matrix, and bisociation as originality. It involves the association of independent matrices, hence the term, bisociation.

7 From Marianne Moore's (1951) poem, The monkey's puzzle, as cited by Houston and Mednick (1963).

8 Although he considers this to be his most important form of association we are not sure if it is original to Mednick or a return to Aristotle's confusion, as pointed out by Hume, in separating similarity and contrast.

9 Bower (1975) points out that contiguity is really a selective process. He cites the work of Garcia and Koelling (1966) who found that a rat will associate stomach sickness with the most recent novel taste he has experienced despite the fact that he tasted other things between that point and the point of his sickness. Bower says

> Such results suggest that contiguity of events in objective time is not a necessary condition for associating them (p. 71).

10 An information processing approach to cognition complements Guilford's SI model very readily because of the strong emphasis placed in the model upon basic varieties of information and its implicit suggestion that man can be viewed as a processor of that information, i.e. that output can never be viewed as more than elementary transformations or recombinations of input. However, it seems more likely that it is the ability (and the motivation) to carry out complex transformations and their sequencing that marks the creative thinker.

11 Wallas was actually discussing thinking, not creativity. This is being imputed to him by Guilford and we doubt if he would have seen the need for such a distinction.

12 Guilford does not agree with the advocates of Synectics (brain-storming), which is based on Osborn's ((1953), 1957) book, Applied Imagination, that the bypassing of the evaluative filter can be consciously controlled. He talks of deliberate idea generation as a part of ordinary rather than creative problem solving. Guilford (1966) says that we can retrieve a quantity of relevant information from memory storage in accordance with a search model but to retrieve this in reorganized form, that is, to make the "intuitive leap", is not something that we can will to do.

13 They cite Polya (1945) who distinguished four phases in the heuristic process (Miller, Galanter and Pribram (1960), 1972).

> First, we must understand the problem. We have to see clearly what the data are, what conditions are imposed, and what the unknown thing is that we are searching for.
>
> Second, we must devise a plan that will guide the solution and connect the data to the unknown.
>
> Third, we must carry out our plan of the solution, checking each step as we go.
>
> Fourth, we should look back at the completed solution, reviewing, checking, discussing, perhaps even improving it (p. 293).

14 It is noteworthy that Miller, Galanter and Pribram (1960) chided cognitive theorists for their sedentary models, pointing out that cognition has something to do with action (Abelson, 1963).

15 Dr. Steve Hunka (University of Alberta, private communication) has pointed out that the recognition of how and what is also related to the distinction between computer emulation and computer simulation.

16 This whole question of prediction and matching in perception seems to us to necessarily imply an a priori view of mind, i.e. some form of inborn "constituting" structure.

17 Abelson (1963) has pointed out that

> Though there is considerable variety in the various cognitive tasks that have come under study, there seems to have been no provision in the computer game for the study of cognition dealing with affect-laden objects - of 'hot cognition' as opposed to the 'cold cognition' of problem solving.

CHAPTER IX

Three non-Mainstream Approaches to Creativity Theory

In this chapter we will be considering a very different body of literature than that which we have worked with in the remainder of the thesis. Our treatment of it, too, will be different because this literature exists outside the conceptual framework of most modern psychology and philosophy. It will be largely descriptive with the addition of a few tentative comments and suggestions because the lack of any firm basis for comparison to the rest of the creativity literature makes meaningful analysis impossible.

All three of the major approaches to creativity theory which will be considered in this chapter are primarily concerned with the question of human motivation: classical psychoanalysis with the analysis of human behavior in terms of unconscious motivation and conflict, and self-actualization theory with the understanding of the human drive towards developing one's own talents and capacities.[1] Psychoanalytic ego psychology falls somewhere in between.

The psychoanalytic approach

Interest in the creativity problem has been present throughout the history of psychoanalysis, beginning with Freud's controversial hypothesis that creativity is a form of sublimation (1930).

> Sublimation of instinct is an especially conspicuous feature of cultural evolution; this it is that makes it possible for the higher mental operations, scientific artistic, ideological activities, to play such an important part in civilized life.
>
> . . . .
>
> (Culture) obtains a great part of the mental energy it needs by subtracting it from sexuality.

Most important psychoanalytic theorists, past and present, have disagreed with Freud's explanation of creativity on the grounds that it is inconsistent and overly reductive. Levey (1939) has provided a critical survey of the early literature on sublimation and he discusses the many problems with this theory.

Two other early psychoanalytic systematizers, Carl Jung and Alfred Adler, held different views on the origins of creativity. Jung saw the creative process in almost mystical terms as an autonomous complex, which develops and emerges from the depths of the unconscious, withdrawing energy from consciousness in the process. (Jung, 1928).

> The creative process, insofar as we are able to follow it at all, consists in an unconscious animation of the archetype, and in a development and shaping of this image till the work is completed.

Adler addressed himself to the concept of genius rather than creativity and spoke of it as depending upon a "high degree of courage and communal intuition"(Adler, 1930). He recognized that it involved something more than could be explained in terms of his theory of psychic compensations for organ inferiority, and talked of man as a consciously active force in shaping his own personality and destiny.

A much more extensive theory of creativity than any of these was that of Otto Rank (1884-1939), an early discliple of Freud who records that he spent most of his professional life trying to escape

from Freud's influence. Rank's central interest, before and after his break with Freud, was in the creative personality. He could not accept Freud's theory of the artist as essentially neurotic and maintained that the creative urge and its realization signify the very opposite of this: a profound acceptance of life and of what Rank calls "life-will".

Rank believed, like Adler, that the creative impulse in the artist springs from the tendency to immortalize himself. He used the term, life-will, to refer to the purposiveness and creativity he considered to be central to human nature. He saw the will as the instinctual force through which man emerges as an individual.

Rank developed his argument that the will is the central integrating principle of personality through his analysis of history as a record of mankind's unending quest for immortality which has taken various forms at various times, each of the four periods he mentions representing an increase in complexity over the one before. Like Jung, with his theory of archetypes and a collective unconscious, Rank wanted to show that the basic insights underlying man's beliefs about life originate beyond consciousness and beyond rationality.

What was unique to Rank's system was his recognition that these beliefs are not fixed and final but vary with the transformations of history. He therefore considered the creative act to be a dynamic mode of knowledge. He saw the creative person as operating at the frontiers of knowledge, able to draw into his creation new eddies of thought which others cannot yet see because of his intense, though subliminal, awareness of the historical realities of his own era (Rank, 1932).

A distinction was drawn by Rank between adapted, neurotic and creative personalities, according to the degree to which the individual had freed himself from the social forces of his time. His emphasis on the will can be seen as a shift towards ego supremacy in the earlier works, which anticipates the direction taken by the later psychoanalytic ego psychologists. However, according to Progoff (1973, p. 204), Rank returned, in his mature work to an emphasis on the irrational powers of the id, i.e. to depth psychology.

The psychoanalytic ego psychology approach

Psychoanalytic ego psychology has provided an entirely new dimension to the psychoanalytic approach to creativity theory. Its proponents, beginning with people like Anna Freud, Harry Stack Sullivan, and Karen Horney (1939), place an increased emphasis on the ego as opposed to the id. But Marmor (1968) credits its ultimate importance as a movement and its much closer position to mainstream psychology than traditional psychoanalysis with its emphasis on

> . . . an open-system module in which the individual's functioning is always examined in the context of his group or field situation. Thus, while Freud's conceptual framework was psychodynamic but individual-centered, the emerging new patterns of psychiatric thinking may be described as psychodynamic but system-centered (p. 4).
>
> . . . .
>
> The constructs of adaptation, learning, information processing, communication, and systems theory, which modern psychoanalysts are beginning to use, are bringing psychodynamic thinking back into the mainstream of modern psychobiological thought (p. 5).

In reconciling traditional and modern psychoanalysis, Marmor says that they are in basic agreement on "the essence of Freud's great contribution" which he considers to be

> . . . the recognition that human behavior is motivated; that the nature of this motivation is often largely concealed from awareness; that our personalities are shaped not only by our biological potentials, but also by experiential vicissitudes; that functional disturbances in human cognition, affect, and behavior are the result of contradictory and conflictual inputs or feedbacks; and that early developmental experiences are of particular significance in shaping subsequent perceptions and reactions in adolescence and adulthood (p. 5).

In the light of this emphasis on the importance of the role of motivation in all forms of psychoanalysis we might consider extrinsic ego-involved and intrinsic task-involved motivations of the creative act (Crutchfield, 1964). Crutchfield speculates about the person being "caught" by the problem in the latter case and of its "autonomous forces" (Jung) taking over, but he also says that it is often ego-involved motives such as the needs for self-enhancement or self-defence that brings the creative person to grips with the problem in the first place. His distinction suggests a shift in emphasis back and forth from the ego to the id and we believe that a recognition of this shift in motivational level may shed some light on the complex motivations of the creative personality.

Regression in the service of the ego. Ernst Kris' concept is widely accepted among many nonpsychoanalytic as well as psychoanalytic creativity theorists as a partial explanation for the creative process. It is based on the more fundamental concept of ego autonomy, although in its popular application this fact often goes unrecognized by non-psychoanalytic theorists.

As an art historian as well as a psychoanalyst, Kris was able to distinguish between the partially controlled regression involved in the creative process and the uncontrolled regression involved in

psychotic states, a distinction which has not always been clearly recognized by other creativity theorists.[2] In a 1953 article he states that

> Topographically, ego regression (primitivization of ego functions) occurs not only when the ego is weak - - in sleep, in falling asleep, in fantasy, in intoxication, and in the psychoses - - but also during many types of creative processes ((pp. 138-39).

Kris suggests that in fantasy the processes of the ego are largely in the service of the id while in reflective thinking (problem solving) the contrary occurs and the autonomous ego interests are served to a higher degree. It is this, he feels, which accounts for the passivity that has so often been observed in connection with the creative insight.

> The maturing of thought, the entry into awareness from preconsciousness to consciousness 3 tend to be experienced as derived from outside, as passively received, not as actively produced.
>
> . . . .
>
> . . . the integrative functions of the ego include self-regulated regression and permit a combination of the most daring intellectual activity with the experience of passive receptiveness (pp. 142-143).

Kris' regression in the service of the ego has become a catch phrase in the literature, but apart from that his theory has had little impact on mainstream creativity research. Such, however, has not been the fate of another prominent psychoanalyst turned creativity theorist.

Access to the preconscious. Lawrence Kubie ((1958), 1973), in his popular book, Neurotic distortion of the creative process, suggests that the creative person is one who, in some as yet unknown way, "has retained his capacity to use his preconscious functions more freely than is true of others who may be equally gifted (p. 48)."

Kubie believes that, unlike the "dynamic unconscious" which functions as a reservoir and arena of unresolved conflicts, the preconscious is not limited by the restrictions of normal language nor imprisoned by conscious repression.

> Preconscious processes are not circumscribed by the more pedestrian and literal restrictions of conscious language.
>
> . . . .
>
> (They) make free use of analogy and allegory, superimposing dissimilar ingredients into new perceptual and conceptual patterns, thus reshuffling experience to achieve that fantastic degree of condensation without which creativity in any field of activity would be impossible. In the preconscious use of imagery and allegory many experiences are condensed into a single hieroglyph, which expresses in one symbol far more than one can say slowly and precisely, word by word, on the fully conscious level. This is why preconscious mentation is the Seven-league Boot of intuitive creative functions (pp. 34-35).

In this passage Kubie appears to be describing a process very similar to the one the early associationists were dealing with. The difference, however, is in the idealist implications of his remarks, i.e. the preconscious is presented as ordering or restructuring its material rather than being itself a part of a random reorganization.

Creativity, i.e. ready access to preconscious processes, is relatively rare according to Kubie because the creative process in each of us is vulnerable to distortion and inhibition by the neurotic process, i.e by blockages from the unconscious which distort and pervert the preconscious material to serve its needs, "precisely as happens in a dream or in the symptom formations of neurotic and psychotic illness (p. 32)".

- The "condensation" Kubie refers to has correlates in other theories of cognition. Piaget (1972) has referred to the phenomenon of transductive reasoning in children. This involves a reasoning

from the particular to the particular as opposed to conscious adult modes of reasoning from the particular to the general (induction) or from the general to the particular (deduction). Even though this might be considered analogical thinking it is not usually creative, however, for children generally lack the information to make relevant transformations of their material. [4]

Ego autonomy. What ultimately separates the neo-psychoanalytic creativity theories of Kris and Kubie from those of other orientations is their emphasis on the supremacy of the ego. Classical psychoanalysis conceived of the ego as reactive, i.e. as blindly reacting to forces set in motion long before, over which it had little or no control. As such, it was just as reductionist and deterministic as naive behaviorism. Psychoanalytic ego psychology, however, has defined the ego as having a significant measure of strength and control. [5]

The ego's change of status in the psychoanalytic literature has been in large part due to a rethinking of the classic ego defence mechanisms conceived of by Freud. Since Kroeber's (1963) historic reference to them as coping mechanisms, they have increasingly been viewed as necessary, adaptive and reality-oriented, rather than as the intricate, protective swaddlings of a hurt personality.

Kroeber (1963) does not view all defence mechanisms as reality-oriented. Also, he hints at the function of intelligence and social class in the choice and maintenance of defence mechanisms. It can not be plausibly argued, for example, that classic reaction-formation is ever an adaptive response to a situation. We believe that Kroeber's distinction between neurotic and non-neurotic defence mechanisms has

important implications for an understanding of the psychodynamic structure of the creative person.

If the kind of anxiety which creativity necessarily generates can be shown to be handled in the present by non-neurotic defence mechanisms, such as tolerance for ambiguity, even though the necessity for exposing oneself to this kind of anxiety should prove to be of neurotic origin, e.g. a compulsive need to order reality (Barron, (1957) 1963) then the motivation of the creative person, as a strong id-controlled drive to engage in creative activity, could be postulated without having to accept as its necessary corollary the existence in the present of strong neurotic pressures operating on the individual.

Some research of a positive nature already exists on the relationship between anxiety and creativity. Barach (1967) has contrasted the kind of anxiety which seems to be an inseparable part of the creative act with non-productive neurotic anxiety, and Lichtenstein (1971) uses an anxiety-reduction theory to explain the productivity of many geniuses, suggesting that these creatives experience a pervasive sense of guilt and anxiety which they find to be relieved by productivity, and which in turn frees creative powers. Such theories help to explain the very strong motivation [6] which must underlie the creative act without reducing creativity, itself, to the level of neurosis.

Transitional theories. All modern psychoanalytic theorists do not take an ego-autonomous point of view. Frank Barron (1968), a psychoanalytically oriented researcher of creative writers, says that

> Forces in the unconscious are blind, they are locked in upon themselves, they do not change one another because essentially there is never a mutual confrontation (p. 234).

Another writer in this venue, who has gone beyond the psychoanalytic orientation with which he began psychology, is Ernest Schachtel. In his major work, Metamorphosis (1959), he dismisses Kris' concept of regression in the service of the ego maintaining that primary process thought is always produced by the striving of the id to return to a tensionless state, which is the classical psychoanalytic view.

> There are daydreams, reveries, and idly wandering thoughts which are correctly or approximately described by the concept of primary-process thought. What the early stages of the creative process have in common with such reveries is mainly the fact that they, too, wander freely without being bound by the rules and properties of the accepted, conventional, familiar everyday world. In this free wandering they center, however, on the object, idea, problem which is the focus of the creative endeavor. What distinguishes the creative process from regression to primary-process thought is that the freedom of the approach is due not to a drive discharge function but to the openness in the encounter with the object of the creative labor (pp. 159-160).

Although best known in the field for his attack on the regression in the service of the ego construct, Schachtel's own special interest in perception has also evolved into a creativity theory. He has recognized two modes of perceiving the world: allocentric and autocentric. He believes that creativity can only result through the former, other-center attitude towards experience. The allocentric perceptual mode involves an openness to the object of perception with a concomitant absence of preconceptions or calculations as to how the object in question can serve one's interests. Secondary autocentricity, the adult mode of autocentricity, involves

the opposite characteristics.

Schachtel suggests that, up to a certain age, a child is limited intellectually and emotionally to an autocentric perception of the world, the primary characteristic of which is egocentricity. Piaget's pre-operational stage in the child involves the same quality. However, Schachtel goes on to theorize that once the child has outgrown these limiting factors his perceptual approach evolves into one of the two modes already mentioned, which can be characterized as non-egocentric or egocentric perception.

Since the allocentric personality is able to value the world for itself, Schachtel suggests that it possesses an openness to experience which its autocentric counterpart does not have and which, according to some of the correlational studies done on personality traits, [7] appears to be a defining characteristic of creative persons. He says (1959)

> The autocentric perspective of the dependent personality usually is the result of a narcissistic attitude which blocks the full view of the other person and limits perception to those (real or distorted) aspects which have a bearing on the neurotic demands and fears of the perceiver (p. 181).

By contrast, allocentric perception involves a feeling of oneness with the object which results from focusing all the perceiver's perceptual awareness on the object so that it is experienced in the fullest possible way. According to Schachtel, this results in a feeling of being fully alive and fully turned toward the object of perception, without wanting to use it and without being in need of it in any way.

Nobody perceives allocentrically all the time, says Schachtel,

because the demands of reality are such that he could not survive. But, while the allocentric perceiver perceives autocentrically part of the time, the neurotic pressures inside the (secondary) autocentric perceiver are such that he perceives allocentrically none of the time. This openness to experience, and therefore his potential for creativity, is blocked off from him.

The self-actualization approach

The psychologists just discussed, whom we have referred to as transitional figures, still adopt a basically Freudian framework of id, ego, super-ego, and conscious, unconscious and preconscious. They make little effort, however, to substitute a new explanation of creative motivation for the ones which they discard. In his research, Barron deals largely in terms of personality traits and preference for perceptual complexity (Barron and Welsh, 1952) while Schachtel thinks of creativity in terms of perceptual style. The psychologists we will be discussing in this section, however, concern themselves even less with an understanding of the inner psychodynamic structure of the individual. Like Schachtel, they are concerned with openness to experience and encounter with the object. Unlike him, they make no effort to explain this in terms of the overall psychodynamic structure of the individual, concentrating instead on describing the self-actualizing person as he appears in the present. This is despite the fact that two of them, Rollo May and Carl Rogers, are trained psychoanalysts.

Like Schachtel and Barron, Rollo May has objected to Kris' regression in the service of the ego concept. And May (1964) has

become one of the main advocates of the self-actualization approach to creativity. He says

> I grant that creativity often seems to be a regressive phenomenon because it brings out archaic, infantile, unconscious psychic contents. But, this is a result rather than a cause and when these archaic elements have genuine power to move others and a universality of meaning - that is, become genuine symbols - it is because some encounter is occurring on a more basic comprehensive level (p. 41).

We can see in this passage several allusions to Jung's creative archetypes and it is noteworthy that Jung was the first to use the concept of self-actualization, followed later by Goldstein (1939) from whom Maslow adopted the concept.

In May's recent book on creativity, The courage to create (1975), encounter has become the central concept in his theory. He talks of "the classic dichotomy between Dionysian vitality and Apollonian order", of Ecstasy as the technical term for their union and of creativity as the encounter of the intensively conscious human being with his or her world, which intensity presumably allows for this union. In a much earlier work, Carl Rogers ((1954), 1973) defined creativity in a very similar fashion.

> My definition, then, of the creative process is that it is the emergence in action of a novel, relational product, growing out of the uniqueness of the individual on the one hand, and the materials, event, people, or circumstances of his life on the other (p. 139).

Our problem with both of these theorists is that the conditions which allow for the encounter between the knower and the known are never clarified. Are they due to the influence of early history, present facilitating environmental circumstances (Gowan, 1972), inborn or acquired personality traits ((Cattell (1965), 1970), or simply

cognitive style[8] or creative teaching? [9] It is difficult to answer this question of the basis of their scattered remarks on creativity. Therefore, we will confine the remainder of our discussion of self-actualization theory to a consideration of the views of its major and most articulate proponent, Abraham Maslow (1908-1970).

Abraham Maslow began his career very conventionally, as a comparative psychologist in the early 1930's. His first articles, co-authored with Harry Harlow, were concerned with delayed reaction tests on primates. [10] It was not until the middle 1940's that Maslow veered towards humanistic psychology (1944; 1947; 1948; 1950). Although he is rightly considered to have been one of the major proponents of this movement, its Zeitgeist nature should be recognized. Those who credit him with being the founder of third-force psychology do so , we believe, because he has best articulated the aims or anti-aims of a very large and diffuse group of psychologists (Maslow, 1968).

> This group includes the Adlerians, Rankians, and Jungians, as well as all the neo-Freudians (or neo-Adlerians) and the post-Freudians (psychoanalytic ego psychologists as well as writers like Marcuse, Wheelis, Marmor, Szasz, N. Brown, H. Lynd, and Schachtel. . . .) In addition, the influence of Kurt Goldstein and his organismic-psychology is steadily growing. So also is that of Gestalt therapy, of the Gestalt and Lewinian psychologists, of the general-semanticists, and of such personality-psychologists as G. Allport, G. Murphy, J. Moreno and H. A. Murray. A new and powerful influence is existential psychology and psychiatry. Dozens of other major contributors can be grouped as Self-psychologists, phenomenological psychologists, growth-psychologists, Rogerian psychologists, humanistic psychologists. . . (p. lx).

Humanistic or third force psychology in America has been strongly influenced, directly or indirectly, by existentialism and German idealism. As a movement, it grew out of the realization that

there is something more to man than it is possible to account for in the mechanistic and reductionistic terms of traditional psychology. What that something is has never been made entirely clear by any of the third force psychologists but Maslow perhaps comes the closest to this with his Being-Psychology. This is basically a description of meta-needs and a recognition of the superior level of development out of which they must necessarily come (Maslow, 1976).

Early in his career Maslow decided what his major research project as a psychologist would be because of his exposure to "two most remarkable human beings": Ruth Benedict and Max Wertheimer. He determined to observe them, and others like them, to find out what made them so unusual. One day he discovered a common pattern between them, and that was the beginning of self-actualization theory.

Maslow describes his scientific approach as the reverse of the normal. He started with the "openly normative", studying what seemed to him to be healthy self-actualizing people, and progressed towards the descriptive level, the ultimate outcome of which was a standardized test of self-actualization (Shostrum 1963). Maslow described his approach as "growing-tip statistics (Maslow, 1976, p. 7)" because he worked with superior subjects to find out the ultimate of which human beings are capable. He observed that, by contrast, the traditional psychologies preferred to work with normal or deviant subjects.

Jung defined self-actualization as the ultimate goal that man strives for, the fullest development of the self, harmony or personality (1928). Goldstein (1939) expanded upon this notion in a different

(pathological) context. What Maslow did was to take the concept of self-actualization as a given to use as an initial assumption and then he set about identifying the qualities that go into it. In the process of doing this he became aware that self-actualizing people have a lot in common with creative people, although he always distinguished between self-actualizing creativity and special talent creativity. He considered the former to be the outcome of, or coincidental with, peak-experiences.

Although Maslow talked about behaviors leading to self-actualization, and about peakers and non-peakers, he was never able to adequately describe these behaviors in common language. He made no apology for this except to observe that our positivistic language structure is not adequate for the task because it is grounded in the dichotomy between subject and object and the peak-experience represents a transcendence of this dichotomy (Maslow, 1976, 331).

In his introduction to The farther reaches of human nature (Maslow, 1976), Henry Geiger does what Maslow could not or would not do and offers the following description of the peak-experience.

> The climax of self-actualization is the peak experience.
>
> . . . .
>
> A peak experience is a coming into the realization that what 'ought to be' is, in a way that requires no longing, suggests no straining, to make it so. It tells human beings something about themselves and about the world that is the same truth, and that becomes the pivot of value and an ordering principle for the hierarchy of meanings. It is the merging of subject and object, involving no loss of subjectivity but what seems its infinite extension. It is individuality freed of isolation. An experience of this sort gives the idea of transcendence an empirical ground. Its typical recurrence for his self-actualizers became for Maslow scientific evidence of what may be the normal psychological or inner life of persons who are

> fully human. The normative element in Maslow's thinking and theory was now present in principle, it remaining to check and fill out the pattern of how self-actualizers behave (xvi-xvii).

We agree with Geiger that Maslow had the makings of a psychological model of self-actualization, but we doubt that it will ever be developed as such. Throughout his scattered writings on this subject, which were only collected into a book after his death, Maslow (1976) refers again and again to the need for empirical verification of his work, apparently failing to recognize the impossibility of this, given the fact that he is operating outside the positivistic (subject-object) framework of Western thought. Yet, as a scientist educated in the rational/empirical context of thought, he had no other frame of reference in terms of which to orient his ideas. Therefore, we believe that most of his writings can be seen as valiant efforts to provide the philosophical ground for his theory rather than as a development of a psychological theory, itself.

The Psychodynamic Continnum of non-Mainstream Creativity Theory

The various non-mainstream approaches to creativity which have been considered in this chapter seem, at the surface level, to be very different from each other. It is our opinion, however, that at a deeper level they are closely related and that the number of ex-psychoanalysts to be found in the ranks of self-actualization theorists is no accident. An early quotation from Maslow, appropriately emphasized by us, will indicate how profoundly this model affected his thinking on creativity, although he, himself, was never a psychoanalyst. Maslow ((1958), 1972) describes his concept of fusion as follows.

Table 10

A Psychodynamic Continuum of non-Mainstream Approaches to Creativity Theory

(mental illness) (mental health)

MECHANISTIC ---------- HUMANISTIC

Psychoanalysis	Analytical Psychology	Individual Psychology	Will therapy	Psychoanalytic-Ego Psychology		Self-Actualization Theory	
(Freud)	(Jung)	(Adler)	(Rank)	(Kris-Kubie)	(Schachtel)	(Rogers -May -Maslow)	
sublimation	animation of the archetype	self-determination	will	ego-autonomy	openness to perception	encounter	fulfillment of potential

> In the healthy person and especially the healthy person who creates, I find that he has somehow managed a fusion of both primary and secondary processes; both conscious and unconscious, ...
>
> . . . .
>
> What happens in this fusion is that both the primary processes and the secondary processes, partaking of each other, then change in character. The unconscious doesn't become frightening anymore. This is the person who can live with his unconscious; live with, lets say, his childishness, his fantasy, his imagination, his wish fulfillment, his femininity, his poetic quality, his crazy quality. He is the person, as one psychoanalyst said in a nice phrase, 'who can regress in the service of the ego'. This is voluntary regression ((pp. 83-85). 12

We are proposing that the major non-mainstream creativity theories can be viewed in terms of a continuum which, with respect to the psychologists discussed in this chapter, extends from Freud's creativity as a function of mental illness model to Maslow's creativity as a function of mental health model. We consider Schachtel to hold a transitional position between psychoanalytic ego psychology and self-actualization theory because the openness to experience he focuses upon is also emphasized by Rogers while his distinction between allocentric and autocentric perception still entails a psychodynamic conception of man based on depth psychology.

The reader might ask how it is possible that self-actualization theory could have evolved from the mechanistic reductionism of psychoanalysis to the humanism of self-determination? Surely this could not be a matter of merely quantitative changes, which is what the concept of a continuum entails? But, while we recognize that the respective ends of this continuum are in one sense polar opposites, it seems to us that in another sense they are the same.

All these positions are the outgrowth of a dynamic conception of personality which is clinically rather than empirically based. The Freudian topography of id, ego and superego is, explicitly or otherwise, basic to all these theories. Yet they are hypothetical constructs which cannot be empirically validated and accordingly they lend themselves most readily to variations in interpretation.[11]

What makes self-actualization theory very different, however, from classical and neo-psychoanalytic theory is that the development of the self is seen as an ongoing process over which the individual has a certain degree of autonomy or self-determination. The environment, then, is not an internal one as it is in depth psychology or a systems one as it is in neo-psychoanalysis (Marmor, 1968), where the presence or absence of creative energy is viewed as a function of the basic personality structure, but rather as an external situational one which varies and which can be controlled either by the individual, himself, or by his employer or teacher on his behalf.

It is this self-determining view of creativity which underlies the efforts of educationists to make schoolrooms places which are more conducive to creative thinking and which explains the interest of business and industry in creativity-training. As such it could be said that the majority of research on creativity which has been done at an applied level is based on the implicit assumption that man is a self-actualizing being.

The decisive shift in psychoanalytic ego psychology which has placed it in the role of intermediary between psychoanalysis and self-actualization theory is its break from Freudian determinism, a break

which was foreshadowed by the work of those early psychoanalytic theorists who rebelled against classical psychoanalysis: Jung, Adler and Rank. The notion of ego autonomy is embedded in the broader philosophical concept of self-determination, i.e. free will. To be sure, it is a qualified indeterminism of a kind that even Skinner (1972) might accept. Nevertheless, it is a significant move away from the passive concept of mind of the early associationists and the closed, reactive system proposed by Freud.

Conclusion

It seems to us that there is a logical problem involved in the psychoanalytic ego psychologists' model of man with reference to ego autonomy. Their de-emphasis on the power of the id, which is "the seat of the libido (Chaplin, 1975, p. 245)", makes it difficult to see how they can explain human motivation, which is the most significant aspect of Freud's steam-engine model of behavior, and which must be taken into account to explain the creative person's drive towards creative activity.

The casual adoption, by self-actualization theorists and others, of ego-autonomy based concepts like tolerance for ambiguity, openness to experience and regression in the service of the ego, outside a psychoanalytic context while at the same time, it seems to us, invoking the solidity of the Freudian model, has helped to obscure this problem in the creativity literature.

Notes - Chapter IX

1 Abraham Maslow developed a motivational hierarchy which Chaplin (1975) defines as

> The theory . . . that human motives form a hierarchy with the primary or physiological drives on the bottom; safety and security next; then gregariousness, love and affection as the next highest category; prestige, power, and possession are immediately higher than gregariousness, love and affection; self-actualization, the need for knowing, and esthetic needs are at the top of the hierarchy (p. 326).

2 For a further discussion of the ways in which these two phenomena have been confused, see Billig, O. Is schizophrenic expression art? A comparative study of creativeness and schizophrenic thinking. J. Nervous and Mental Disease, 1971, 153, 3, 149-164. See also Cropley, A. & Sikland, J. Creativity and schizophrenia. J. Consulting and Clinical Psychology, 1973, 40, 3, 462-468.

3 This is 'consensual validation' for our similar point made in the conclusion of Chapter VIII.

4 For a discussion of transformations and of intelligence threshold, which is also relevant to this issue, see Chapter IV. According to Kubie ((1958), 1973) the preconscious stores attributes like smoothness, browness, shininess, and recalls them analogically. We take this to mean that a phrase like "The lion's ferocious chrysanthemum head" (cited by Mednick, 1962) could never be derived from storing whole items like lion and chrysanthemum but only by storing elements of these items, e.g. shaggy roundness, tawny yellowness, toughness and tenderness. Then, by reasoning "from the particular to the particular (Piaget, 1972)" it is conceivably possible to make the relationship between two totally different entities joined by a common element or elements.

It can also be pointed out that information processing theory has recognized the problem of storing particularities and the necessity of classifying in order to accommodate all the data. Retrieval systems allow entry from a number of different points.

5 The notion of ego control has very much pervaded the general literature on personality theory. Cattell, for example, has operationalized an ego strength construct (see Appendix B).

6 As Cattell has pointed out, among others (see Chapter V).

7 In the creativity literature, trait correlational studies have

also been done on: introversion-extroversion, authoritarianism, dogmatism-open mindedness, rigidity, risk-taking, orientation type (task, self or interaction), locus of control (internal or external), conformity-suggestibility, curiosity, stability-instability, and leadership.

8 As early as 1955, Catherine Patrick suggested that field articulation, a sensory register process involving the ability to strain out irrelevant cues, might be a partial measure of the flexibility necessary for the creative process, while the rigidifying effect of Einstellung (advance cognitive sets) would work against creative discovery.

A significant amount of other material on cognitive style has also appeared in the creativity literature through the years. Topics which have been considered include: information search patterns, focusing vs. gambling strategies, field dependence/independence, rigidity and advance cognitive sets.

9 E. Paul Torrance is the unquestionable leader in this area. He has used Osborn's ((1953), 1957) principles of adding to, and reassembling, among others, in the construction of his teaching program for developing creative ideas (see Torrance, 1963). Suchman (1961) has gone so far as to suggest that children can be trained to formulate the same kinds of unifying concepts in science which are produced by our most creative scientists.

10 Maslow's complete bibliography is included as Appendix E in Maslow (1976).

11 The clinical method involves extensive systematic analyses of individuals in treatment. The dangers to scientific objectivity of such an approach have been frequently pointed out and it is a long-standing joke that complexes interpreted through this technique tend to take on the particular orientation of the analyst, e.g. Jungian, Rogerian, and so forth. The phenomenon of therapist projection in clinical psychology helps to explain why orientations like self-actualization theory and classical psychoanalysis can appear to be polar opposites even though they are grounded in the same basic topology.

12 Maslow uses psychoanalytic terminology very casually in this passage and notably, he also takes the opposite view to the efficacy of the regression in the service of the ego concept that Schachtel and May hold. It seems quite apparent that he is not conceptualizing in terms of a particular psychodynamic structure in the way that they are.

EPILOGUE

> Creating is uniting opposites where you are yourself one of the opposites; so that you become something where you were nothing before, what you make is something where there was nothing before, and the two processes are inseparable, so that creation is happening at once in both of them (p. 117).
>
> (Hofstadter, 1974)

> Perceptual organization is not a photographic process. It is fundamentally an innovative act; it is an interactive, adjustive relationship between the perceiver and the thing perceived. The two together make up a dynamic creative whole (p. 114).
>
> (Barnett, 1953)

CONCLUSION

Positivism: Its Epistemological Implications for Creativity Theory

With reference to the foundations of our belief in science, Polanyi ((1962), 1974) has said the following.

> I suggest now that the supposed pre-suppositions of science are so futile because the actual foundations of our scientific beliefs cannot be asserted at all. When we accept a certain set of pre-suppositions and use them as our interpretative framework, we may be said to dwell in them as we do in our own body. Their uncritical acceptance for the time being consists in a process of assimilation by which we identify ourselves with them. They are not asserted and cannot be asserted, for assertion can be made only within a framework with which we have identified ourselves for the time being; as they are themselves our ultimate framework, they are essentially inarticulable (pp. 59-60).

We have now completed as extensive an examination of the creativity literature and its conceptual origins as we are able to do in a reasonable space and Polanyi's remarks seem very apt within this context. The varying points of view we have considered have all been expressed within the same "ultimate framework" of Western positivism. However, while it is quite evident that the mainstream theories of creativity we have discussed all assume a rational and naturalistic model of mind, this is not so apparent for the non-mainstream theories.

Psychoanalysis is founded on the theory of psychodynamic irrationalism but we believe that this concept of irrationalism is only conceivable as a negation of the larger, rational context of Western thought. We suggest that the apparently non-deterministic

element of mind represented in psychoanalytic theory by the presence of the anarchic id can actually be explained in terms of a purely mechanical closed system of action-reaction, Freud's steam-engine model. That is to say, the irrational forces of the id, the subsequent formation of the ego as a mirror response to the given social reality, the introjection of parental values and concomitant formation of the super-ego, together with the conscious-unconscious-preconscious apparatus can all be seen as parts of a closed system where libidinal energies react with genetic and environmental givens to produce responses which could have been anticipated in advance if all the relevant information were available and if all the complex and subtle interactions could be understood.

It might be thought that modern psychoanalytic ego psychologists who de-emphasize the powers of the id and place an increased emphasis on the autonomy of the ego have incorporated a non-deterministic element into their model. However, this ego autonomy is still conceived of as occurring within a closed system determined by social and genetic factors, although this is thought to be larger than the traditional Freudian one (Marmor, 1968). Like other interactionist theories which hold that personality is affected by the child's entire network of inter-personal relationships and experiences as these interact with his genetic capacities this theory is entirely deterministic. It assumes that the human mind conforms to natural laws and that once the rich complex of interactions can be understood they will be entirely accountable in empirical terms.

We can conclude that free will is not a part of the psychoanalytic models of Freud or the neo-Freudians because the [1]

irrational element in them is only irrational in the sense that it is not congruent with the logic of consciousness and not in the more fundamental sense that it is inexplicable in terms of the logic of the larger social system. However, this entire argument might be viewed as gratuitous because Freud and his successors have been very much caught up in twentieth century scientism and have only argued for the complexity of the laws which govern human behavior rather than for the case that it is not ultimately governed by natural law. The same cannot be said for humanistic psychology and self-actualization/creativity theory. [2]

The raison d'etre of third force psychology is its reaction against the mechanism and determinism of psychoanalytic and mainstream psychology (Drews, 1974). Humanistic psychologists see man holistically, as comprising something more than the sum of his parts and as not totally comprehensible in terms of natural laws. They consider human thought to have an arational or supra-rational quality which complements or even supercedes that rational thought which is the chief characteristic of Western positivism. We suggest, however, that an Eastern thinker might find most third force descriptions of this "transcendent thinking (Maslow, 1976)" to be very typically Western in certain important respects.

In his book, Creativity and Taoism, Chang Chung-yuan (1963) describes thinking in the following terms.

> This pure reflection gives us no intervening moment for consideration or analysis by the tools of the intellect. . . . It is immediate without deliberation. It does not admit of hypothesis and conclusion. . . .
>
> . . . .

> In this stage one is no longer attached to either action or non action, one transcends both as they are ordinarily conceived. The mind attains illumination and is absolutely free. It is a bright mirror free for its creative function (p. 87).

This Taoistic conception of the act of thinking contains two elements of interest to us: (1) the immediacy of knowledge and (2) the transcendence of the ego, which Maslow (1976) refers specifically to as "a kind of Taoistic attitude (p. 261)". However, we observe also in Maslow's writings (1976)[3] that he distinguishes between "transcenders and non-transcenders" ; "peakers and non-peakers", thus erecting some of the very dichotomies he has decried (p. 156).

Krippner and Arons (1973) have distinguished between creative tendencies in the East and West by comparing the artist to the mystic.

> Both artist and mystic, at the time of insight, experience a deep sense of personal fulfillment, but the mystic works gratuitously for revelation alone. The creative worker is predatory; he grabs the insight for a filled purpose, he is far less than divine and the Promethean fire-snatching symbol seems very appropriate (p. 121).

It seems to us that there is a definite "fire-snatching" quality about such phrases (Maslow, 1976) as "(transcenders) can sacralize everything at will (p. 273)". In reading it we have to ask: What motivates the transcender to "sacralize"? And as Bloomberg (1973) has pointed out, personal motivation, even of the "higher" kinds like self-development or enlightenment, is not compatible with the total Taoistic regard for the object in its "suchness". He claims that Schachtel includes self-actualization in his list of autocentric, extrinsic motivations for knowing.[4]

> But allocentricity means that one is open primarily to outer, not inner, experience. Sexual or aggressive or even

> actualization motives, all of which are extrinsic to an open encounter with objects, would only curtail creative functioning (p. 21).

In her article, significantly entitled "A culture-bound concept of creativity", Clifford ((1964), 1973) has pointed out the historic, cultural concerns of her fellow Americans for novelty, production and egalitarianism. She describes America as "a nation of doers (p. 330)". Faced with a concept like Schachtel's "openness to experience" it seems natural to assume, then, that the typical response of the American creativity theorist would be: How do we go about developing this openness to experience? His reasons for wanting to do that would be to improve creative thinking ability, and his reasons for wanting to do that have already been referred to in the quotation from Krippner and Arons (1973). In other words, the very concept of creativity in America is an active, goal-directed one. We believe that the self-defeating nature of this approach has been alluded to by several writers (Kohl, 1965, p. 34; Cattell, 1971, p. 419; Kuhn, 1963, pl 354; Ghiselin, 1963, pp. 37-38) in their remarks on the high number of inventors and the low number of "first-level" creatives in America.

It does not seem to us that the concept of ego-transcendence in the West has the same meaning as it does in the East [5] where it seems to entail a genuine breaking down of the subject-object dichotomy through a temporary dissolution of the boundary of the ego in the act of "apprehending" the object. We do not believe that such a genuine transcendence of self-consciousness is possible in the West. At least, we have seen no evidence of it. We are brought back to Polanyi's remark about the foundations of belief. Individualism [6]

is a fundamental value of Western thought. It is unrealistic to think we can escape it by a little verbal manipulation.[7]

Thinking and creative thinking. What is thinking and why is it so difficult to understand? Thinking is a seeking after knowledge. The successful act of thinking is at the same time an act of knowing. Therefore, thinking and knowing cannot be separated from each other and accordingly creative thinking can be defined as a way of knowing. Stenhouse (1973) has defined it as follows:

> (Creativity) is in most instances not pushing into the 'unknown' - it is pushing into the 'known'. The 'known' has to be pushed aside and an 'unknown' revealed; once this has been done the 'unknown' can be touched and felt over and its contours mapped (p. 106).

We have pointed out that in the West the act of knowing is founded on the subject-object dichotomy. That is, the knower can only know an object, a "distantiated percept", to quote Arnheim (Peterson, 1972), or as Husserl would say, "Intentionality is intentionality of". At least this is what our "ultimate framework" tells us. Yet we must recognize that an exclusive emphasis on the rational mode of thinking exists only within the Western context.

We believe that if it were possible to develop a fuller psychological understanding of non-rational modes of thinking, the kind of understanding that Kubie ((1958), 1973) has tried to develop, for example, then the term, creativity, would cease to be a viable or necessary concept. Creative thinking would be recognized as an integral part of the thinking process if the concept of thinking were not so impoverished by the proscriptions of Western rationalism.

Why have psychologists failed to undertake the necessary research on non-rational modes of knowing like intuition [8] or what Polanyi ((1958), 1974) refers to as personal knowledge? Rejection of all forms of "mentalism" in an effort to adhere to the physical sciences paradigm is the explanation usually given for psychology's general avoidance of apparently unoperationalizable constructs. In the case of non-rational knowledge, however, we believe there is another reason.

Belief in or acceptance of non-rational knowledge is incompatible with the "ultimate framework" of positivism [9] in terms of which psychologists and all other Western thinkers operate. That is why the suggestion from third force psychologists that we can make some steps towards resolving this problem and others like it if only we revise our definition of science [10] is inadequate. It is the entire Western positivistic epistemology which underlies all our particular forms of knowledge in both the sciences and the humanities which will have to be revised if we are to come to terms with the historically well-evidenced phenomenon of non-rational knowledge. And it is our opinion that, until we do this, we will never resolve the creativity issue.

Notes - Conclusion

1 As already pointed out, Jung, Rank and Adler did incorporate non-deterministic elements into their theories.

2 Maslow (1976) says

> My feeling is that the concept of creativeness and the concept of the healthy, self-actualizing, fully human person seem to be coming closer and closer together, and may perhaps turn out to be the same thing (p. 55).

3 In fairness to Maslow we must point out that this book is a collection of his articles published posthumously and written over a period of approximately 20 years, during which time there was much evolution in his thought. Many of his later ideas such as his distinction between B-values and D-values (being and deficiency) in his "Notes on innocent cognition", we find to be very suggestive and they certainly go beyond the positivistic context. However, he could not always sustain his transcendence of the "ultimate framework" and we doubt if his successors will be able to do this either, without his "non-rational knowledge" to guide them.

4 We have not been able to verify this through our reading of Schachtel, and we note that Mackler & Shontz (1965) and Gilchrist (1972, p. 43) describe him as a self-actualization theorist, himself. However, the basic idea that Bloomberg is expressing is one which makes sense to us no matter who said it.

5 We observe a "seven-league boots" approach to the topic of ego transcendence in the West, where it is conceived of more as an ego expanding process than an ego dissolving one. That is to say, the subject-object dichotomy breaks down not because boundaries break down but because the ego expands to absorb the object. The exception to this is the new humanism based on dialectical phenomenology (see Graumann's remarks, ff. 32, p. 67).

6 Chaplin (1975) defines individualism as "The doctrine that the individual is of paramount importance".

7 Edie (1964-65) has suggested that a proper transcendental phenomenology would avoid the subject-object dichotomy and permit concentration on the integration of unity of the knowing process as such, a problem that Husserl never really came to terms with. In a private communication, Dr. Fred Van de Pitte (University of Alberta) has suggested that conscious attempts in the history of Western thinking to escape the subject-object dichotomy can be traced back to Kant, if not before, and that for Kant knowledge meant an integrated awareness where no artificial division would exist between the known and the knower.

8 Edwards ((1967), 1972) defines intuition as "knowledge which does not entail ability to define the concept. . . (knowledge) not preceded by inference (V. 4, p. 204)". We note that the Concise Oxford (1944) defines to define as "(to) settle limits of, make clear, especially in outline (well-defined image;. . . (p. 297).

According to Edwards, Bergson defined intuition as a breaking down of the subject-object dichotomy.

> Unlike the intellect, which remains outside what it knows, requires symbols, and produces knowledge that is always relative to some viewpoint, intuition enters into what it knows, dispenses with symbols, and produces knowledge that is absolute (Edwards, V. 1, p. 291).

9 Positivism is being used throughout to refer to an epistemological position which is based on a dichotomous distinction between knower and known and the belief that the only possible source of knowledge is the evidence of the senses, and its only verification empirical.

10 In recent years humanistic psychologists have argued that science is narrowly defined in Britain and North America in comparison to the German Wissenschaft or French science, and their equivalents in other European languages. The continental tradition has been to use the term, science, in the broad sense of investigative scholarship. It therefore encompasses such diverse activities as history, philosophy and even theology.

Defining science so broadly has significant implications for method since the same quantitative techniques that are used in the physical sciences can hardly be applied to the humanities. Third force psychologists have argued that psychology, in terms of this understanding of science, need not and should not restrict itself to the former.

Berlyne (1975) has extended this argument by tracing the classic historicist and hermeneutic currents in European thought down to such 19th century distinctions as Windelband's nomothetic and idiopathic. "Humanistic scholarship", as Berlyne calls it, would fall into the latter category.

> An idiopathic investigator begins by interviewing and observing persons relevant to his investigation, thoroughly immersing himself in documents and other artifacts produced by them, and studying as many features as possible of the physical and social environment to which they have been exposed. All this enables him to recreate within his own mind and, through his writings, in the minds of his readers the conscious experiences of the actors in question.
>
> . . . .
>
> The hallmark of validity is a 'feeling of evidence (Evidenzerlebnis)' in the mind of the investigator and his readers ((pp. 12-13)

We note that this is exactly the method Maslow used.

Another interesting discussion about science which we might mention here is Karl Popper's Logic of Scientific Discovery (1959). He distinguishes between true science and pseudo-science on the grounds of the former's falsifiability, his point being that a true science puts itself to the test of experience and can be proved wrong or in need of modification. By contrast, a pseudo-science, in which category he includes idealist metaphysics, Marxism and psychoanalysis, holds certain assumptions as basic and unalterable and thus not open to falsification.

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APPENDIX A

Initial Division of the Literature into 60 Categories

I What is creativity? (general articles)
- A Definition of creativity
- B Definition of originality
- C Proposed creativity models
  - 1 Psychoanalytic ego psychology
    - a general
    - b dreams and primary process thought
    - c regression in the service of the ego
    - d hypnosis
  - 2 Psychoanalysis
    - a general
    - b neurosis
    - c schizophrenia (psychosis)
  - 3 Structure-of-intellect (creativity as divergent thinking)
  - 4 Mednick's associative hierarchy
  - 5 Divine model (the artist as creator)
- E Reviews on creativity
- F Books of collected articles on creativity

II What factors affect creativity?
- A General
  - 1 facilitators
  - 2 inhibitors
- B Multi-factorial / trait-correlational studies
- C Psychological factors
  - 1 Conflict and anxiety
  - 2 Emotionality
  - 3 Motivation
  - 4 Self-concept/ peer acceptance
  - 5 Personality traits: general studies
  - 6 Personality traits: specific studies
    - a masculinity-femininity
    - b introversion-extroversion
    - c authoritarianism

d dogmatism-open mindedness
e rigidity
f risk-taking
g orientation type: task, self or interaction
h locus of control: internal or external
i conformity-suggestibility
j curiosity
k stability-instability
l leadership

D Biological Factors
1 Brain physiology
2 Sensory stimulation/deprivation studies
3 Sex differences
4 Blindness/deafness
5 Age

E Intellectual factors
1 Cognitive style
a information search patterns
b perceptual processing differences: Gestalt studies
c field independence
2 Verbal style
3 Sense of humor
4 Concreteness (Jensen)

F Self-actualization

G Socio-cultural factors
1 socio-economic status
2 cross-cultural studies
3 racial studies
4 religion
5 values
6 familial factors
a birth order
b studies on pre-school children

III Can people be trained to think creatively?
A Idea production (synectics)
B Problem solving
C Creativity in groups and dyads
D Creativity training in business and industry
E Creativity teaching techniques and attitudes for teachers

F Therapy for releasing creativity

IV The assessment and measurement of creativity

A Prediction of creative performance

B Biographical Studies

1 retrospective studies
a creativity and genius
b creativity and eminence

2 characteristics of creative professionals

C Testing creativity

1 research on the Remote Associates Test

2 research on the Rorschach

3 research on the SI model

4 pre-school creativity tests

5 problems in creativity testing
a test bias
rater bias
faking
time pressure

6 general methodological problems in creativity testing

V Miscellaneous topics in creativity

A Creative women

B Problems of creative children

C Consciousness expansion
1 drugs and creativity
2 extra-sensory projection

Appendix B

Excerpts from Cattell's Manual for the 16 PF

Capsule Descriptions of the Sixteen Primary Personality Factors

INTERPRETATION OF THE PRIMARY FACTORS

Predictions of scores on various criteria, and assignment of individuals to various diagnostic clinical groups, can be carried out actuarially, by computation from standard scores, using methods discussed in detail in the *Handbook* and elsewhere. Where no correlations with criteria are known, knowledge of the psychological nature of the factors must guide initial prediction until empirical studies can be done in a particular situation. Moreover, even where correlational, actuarial evidence about a certain criterion is available, it is desirable to add psychological judgment to immediate statistical computations to allow for changes of personality with learning, maturation, etc., or for anticipated changes in life situation.

Each of the primary factors measured by the 16 PF has an alphabetic designation (A through Q_4), a technical title (which is given in parentheses in the following descriptions), and a brief, less technical title (given here in boldface), which the practitioner will most commonly use.

The definitions and interpretations of the factors, as given below, are short, non-technical, and, of course, less exact than the more intensive discussions available in the *Handbook* and elsewhere (see *Handbook* References and the list of supplementary references given in Section 6 of this *Manual*). Furthermore, the large number of profiles given in the *Handbook* for well-defined occupational and clinical groups provides the psychologist with additional insights into the meaning and operation of the factors.

Capsule Descriptions of the Sixteen Primary Personality Factors

FACTOR A

Low Score Direction: ***Reserved,*** Detached, Critical, Cool (Sizothymia)

High Score Direction: ***Outgoing,*** Warmhearted, Easy-going, Participating (Affectothymia)

The person who scores low (sten of 1 to 3) on Factor A tends to be stiff, cool, skeptical, and aloof. He likes things rather than people, working alone, and avoiding compromises of viewpoints. He is likely to be precise and "rigid" in his way of doing things and in personal standards, and in many occupations these are desirable traits. He may tend, at times, to be critical, obstructive, or hard.

The person who scores high (sten of 8 to 10) on Factor A tends to be goodnatured, easy-going, emotionally expressive (hence naturally Affectothymia), ready to cooperate, attentive to people, softhearted, kindly, adaptable. He likes occupations dealing with people and socially impressive situations. He readily forms active groups. He is generous in personal relations, less afraid of criticism, better able to remember names of people.

FACTOR B

Less Intelligent, Concrete-thinking (Lower scholastic mental capacity) *vs.* ***More Intelligent,*** Abstract-thinking, Bright (Higher scholastic mental capacity)

The person scoring low on Factor B tends to be slow to learn and grasp, dull, given to concrete and literal interpretation. His dullness may be simply a reflection of low intelligence, or it may represent poor functioning due to psychopathology.

The person who scores high on Factor B tends to be quick to grasp ideas, a fast learner, intelligent. There is some correlation with level of culture, and some with alertness. High scores contraindicate deterioration of mental functions in pathological conditions.

FACTOR C

Affected By Feelings, Emotionally Less Stable, Easily Upset (Lower ego strength) *vs.* ***Emotionally Stable,*** Faces Reality, Calm, Mature (Higher ego strength)

The person who scores low on Factor C tends to be low in frustration tolerance for unsatisfactory conditions, changeable and plastic, evading necessary reality demands, neurotically fatigued, fretful, easily emotional and annoyed, active in dissatisfaction, having neurotic symptoms (phobias, sleep disturbances, psychosomatic complaints, etc.). Low Factor C score is common to almost all forms of neurotic and some psychotic disorders.

The person who scores high on Factor C tends to be emotionally mature, stable, realistic about life, unruffled, possessing ego strength, better able to maintain solid group morale. Sometimes he may be a person making a resigned adjustment* to unsolved emotional problems.

*Shrewd clinical observers have pointed out that a good C level sometimes enables a person to achieve effective adjustment despite an underlying psychotic potential.

FACTOR E

Humble, Mild, Accommodating, Conforming (Submissiveness) *vs.* ***Assertive,*** Independent, Aggressive, Competitive, Stubborn (Dominance)

The person who scores low on Factor E tends to give way to others, to be docile, and to conform. He is often dependent, confessing, anxious for obsessional correctness. This passivity is part of many neurotic syndromes.

The person who scores high on Factor E is assertive, self-assured, and independent-minded. He tends to be austere, a law to himself, hostile or extrapunitive, authoritarian (managing others), and disregards authority.

FACTOR F

Sober, Prudent, Serious, Taciturn (Desurgency) *vs.* ***Happy-go-lucky,*** Impulsively Lively, Enthusiastic (Surgency)

The person who scores low on Factor F tends to be restrained, reticent, introspective. He is sometimes dour, pessimistic, unduly deliberate, and considered smug and primly correct by observers. He tends to be a sober, dependable person.

The person who scores high on this trait tends to be cheerful, active, talkative, frank, expressive, effervescent, carefree. He is frequently chosen as an elected leader. He may be impulsive and mercurial.

FACTOR G

Expedient, Evades Rules, Feels Few Obligations (Weaker superego strength) *vs.* ***Conscientious,*** Persevering, Staid, Rule-bound (Stronger superego strength)

The person who scores low on Factor G tends to be unsteady in purpose. He is often casual and lacking in effort for group undertakings and cultural demands. His freedom from group influence may lead to anti-social acts, but at times makes him more effective, while his refusal to be bound by rules causes him to have less somatic upset from stress.

The person who scores high on Factor G tends to be exacting in character, dominated by sense of duty, persevering, responsible, planful, "fills the unforgiving minute." He is usually conscientious and moralistic, and he prefers hard-working people to witty companions. The inner "categorical imperative" of this essential superego (in the psychoanalytic sense) should be distinguished from the superficially similar "social ideal self" of Q$_3$+.

FACTOR H

Shy, Restrained, Diffident, Timid (Threctia) *vs.* ***Venturesome,*** Socially-bold, Uninhibited, Spontaneous (Parmia)

The person who scores low on this trait tends to be shy, withdrawing, cautious, retiring, a "wallflower." He usually has inferiority feelings. He tends to be slow and impeded in speech and in expressing himself, dislikes occupations with personal contacts, prefers one or two close friends to large groups, and is not given to keeping in contact with all that is going on around him.

The person who scores high on Factor H is sociable, bold, ready to try new things, spontaneous, and abundant in emotional response. His "thick-skinnedness" enables him to face wear and tear in dealing with people and grueling emotional situations, without fatigue. However, he can be careless of detail, ignore danger signals, and consume much time talking. He tends to be "pushy" and actively interested in the opposite sex.

FACTOR I

Tough-minded, Self-reliant, Realistic, No-nonsense
(Harria)

vs.

Tender-minded, Dependent, Over-protected, Sensitive
(Premsia)

The person who scores low on Factor I tends to be practical, realistic, masculine, independent, responsible, but skeptical of subjective, cultural elaborations. He is sometimes unmoved, hard, cynical, smug. He tends to keep a group operating on a practical and realistic "no-nonsense" basis.

The person who scores high on Factor I tends to be tender-minded, day-dreaming, artistic, fastidious, feminine. He is sometimes demanding of attention and help, impatient, dependent, impractical. He dislikes crude people and rough occupations. He tends to slow up group performance, and to upset group morale by unrealistic fussiness.

FACTOR L

Trusting, Adaptable, Free of Jealousy, Easy to Get on With
(Alaxia)

vs.

Suspicious, Self-opinionated, Hard to Fool
(Protension)

The person who scores low on Factor L tends to be free of jealous tendencies, adaptable, cheerful, un-competitive, concerned about other people, a good team worker.

The person who scores high on Factor L tends to be mistrusting and doubtful. He is often involved in his own ego, is self-opinionated, and interested in internal, mental life. He is usually deliberate in his actions, unconcerned about other people, a poor team member.

N.B. This factor is *not* necessarily paranoia. In fact, the data on paranoid schizophrenics are not clear as to typical Factor L value to be expected.

FACTOR M

Practical, Careful, Conventional, Regulated by External Realities, Proper
(Praxernia)

vs.

Imaginative, Wrapped up in Inner Urgencies, Careless of Practical Matters, Absent-minded
(Autia)

The person who scores low on Factor M tends to be anxious to do the right things, attentive to practical matters, and subject to the dictation of what is obviously possible. He is concerned over detail, able to keep his head in emergencies, but sometimes unimaginative.

The person who scores high on Factor M tends to be unconventional, unconcerned over everyday matters, Bohemian, self-motivated, imaginatively creative, concerned with "essentials," and oblivious of particular people and physical realities. His inner-directed interests sometimes lead to unrealistic situations accompanied by expressive outbursts. His individuality tends to cause him to be rejected in group activities.

FACTOR N

Forthright, Natural, Artless, Sentimental
(Artlessness)

vs.

Shrewd, Calculating, Worldly, Penetrating
(Shrewdness)

The person who scores low on Factor N tends to be unsophisticated, sentimental, and simple. He is sometimes crude and awkward, but easily pleased and content with what comes, and is natural and spontaneous.

The person who scores high on Factor N tends to be polished, experienced, worldly, shrewd. He is often hardheaded and analytical. He has an intellectual, unsentimental approach to situations, an approach akin to cynicism.

FACTOR O

Placid, Self-assured, Confident, Serene
(Untroubled adequacy)

vs.

Apprehensive, Worrying, Depressive, Troubled
(Guilt proneness)

The person who scores low on Factor O tends to be placid, with unshakable nerve. He has a mature, unanxious confidence in himself and his capacity to deal with things. He is resilient and secure, but to the point of being insensitive of when a group is not going along with him, so that he may evoke antipathies and distrust.

The person who scores high on Factor O tends to be depressed, moody, a worrier, full of foreboding, and brooding. He has a childlike tendency to anxiety in difficulties. He does not feel accepted in groups or free to participate. High Factor O score is very common in clinical groups of all types (see *Handbook*).

FACTOR Q_1

Conservative, Respecting Established Ideas, Tolerant of Traditional Difficulties
(Conservatism)

vs.

Experimenting, Critical, Liberal, Analytical, Free-thinking
(Radicalism)

The person who scores low on Factor Q_1 is confident in what he has been taught to believe, and accepts the "tried and true," despite inconsistencies, when something else might be better. He is cautious and compromising in regard to new ideas. Thus, he tends to oppose and postpone change, is inclined to go along with tradition, is more conservative in religion and politics, and tends not to be interested in analytical "intellectual" thought.

The person who scores high on Factor Q_1 tends to be interested in intellectual matters and has doubts on fundamental issues. He is skeptical and inquiring regarding ideas, either old or new. He tends to be more well informed, less inclined to moralize, more inclined to experiment in life generally, and more tolerant of inconvenience and change.

FACTOR Q_2

Group-dependent, A "Joiner" and Sound Follower
(Group adherence)

vs. ***Self-sufficient,*** Prefers Own Decisions, Resourceful
(Self-sufficiency)

The person who scores low on Factor Q_2 prefers to work and make decisions with other people, likes and depends on social approval and admiration. He tends to go along with the group and may be lacking in individual resolution. He is not necessarily gregarious by choice; rather he needs group support.

The person who scores high on Factor Q_2 is temperamentally independent, accustomed to going his own way, making decisions and taking action on his own. He discounts public opinion, but is not necessarily dominant in his relations with others (see Factor E). He does not dislike people but simply does not need their agreement or support.

FACTOR Q_3

Undisciplined Self-conflict, Careless of Protocol, Follows Own Urges
(Low integration)

vs. ***Controlled,*** Socially precise, Following Self-image
(High self-concept control)

The person who scores low on Factor Q_3 will not be bothered with will control and regard for social demands. He is not overly considerate, careful, or painstaking. He may feel maladjusted, and many maladjustments (especially the affective, but not the paranoid) show Q_3-.

The person who scores high on Factor Q_3 tends to have strong control of his emotions and general behavior, is inclined to be socially aware and careful, and evidences what is commonly termed "self-respect" and regard for social reputation. He sometimes tends, however, to be obstinate. Effective leaders, and some paranoids, are high on Q_3.

FACTOR Q_4

Relaxed, Tranquil, Torpid, Unfrustrated
(Low ergic tension)

vs. ***Tense,*** Frustrated, Driven, Overwrought
(High ergic tension)

The person who scores low on Factor Q_4 tends to be sedate, relaxed, composed, and satisfied (not frustrated). In some situations, his oversatisfaction can lead to laziness and low performance, in the sense that low motivation produces little trial and error. Conversely, high tension level may disrupt school and work performance.

The person who scores high on Factor Q_4 tends to be tense, excitable, restless, fretful, impatient. He is often fatigued, but unable to remain inactive. In groups he takes a poor view of the degree of unity, orderliness, and leadership. His frustration represents an excess of stimulated, but undischarged, drive.

APPENDIX C

Associationism - Supplementary Information

Aristotle: His contribution to association theory (Warren, 1921).

(1) He was the first to point our clearly that the sequence of cognitive experiences is not mere chance, but occurs through a definite process of natural association.
(2) He recognizes habit as an important factor in determining association - subject, however, to individual variations.
(3) Most important of all, he specifies contrast, and contiguity as the sole basis of 'habitual associative connection'.
(4) He declares that the same laws hold in purposive thinking as in the spontaneous flow of thought.

Fusion, or simultaneous association, was not altogether overlooked by Aristotle, though his discussion of this point contains more a priori reasoning than introspection. Two separate simultaneous sensations, he says, are impossible (pp. 27-28).

Brief explanation of Aristotle's principles of association.

(1) Similarity - refers to the common observation that one idea tends to elicit another idea which has properties in common with it.

(2) Contrast - refers to the observation that an object, thought of or experienced, often brings to mind its opposite.

(3) Contiguity - refers to the fact that events closely related in space or time tend to be associated together in memory. The "law of contiguity" is still accepted by many learning theorists.

Thomas Hobbes ((1651), 1958): Excerpts from Leviathan, Part 1, Chapter 3, "Of the consequences or train of imaginations".

By consequence or train of thoughts, I understand that succession of one thought to another which is called, to distinguish it from discourse in words, mental discourse.

When a man thinks on anything whatsoever, his next thought after is not altogether so casual as it seems to be. Not every thought succeeds indifferently. But as we have no imagination whereof we have not formerly had sense, in whole or in parts, so we have no transition from one imagination to another whereof we never had the like before in our senses. The reason whereof is this. All fancies are motions within us, relics of those made in the sense; and those motions that

immediately succeeded one another in the sense continue also together after sense; insomuch as the former coming again to take place and be predominant, the latter follows by coherence of the matter moved, in such manner as water upon a plane table is drawn which way any one part of it is guided by the finger. But because in sense to one and the same thing perceived sometimes one thing, sometimes another succeeds, it comes to pass in time that in the imagining of anything there is no certainty what we shall imagine next; only this is certain: it shall be something that succeeded the same before at one time or another

This train of thoughts, or mental discourse, is of two sorts. The first is unguided, without design and inconstant, wherein there is no passionate thought to govern and direct those that follow to itself as the end and scope of some desire or other passion - in which case the thoughts are said to wander, and seem impertinent one to another as in a dream. . . .

The second is more constant, as being regulated by some desire and design. . . .

The train of regulated thoughts is of two kinds: one, when of an effect imagined we seek the causes or means that produce it, and this is common to man and beast. The other is when, imagining anything whatsoever, we seek all the possible effects that can by it be produced - that is to say, we imagine what we can do with it when we have it. Of which I have not at any time seen any sign but in man only, for this is a curiosity hardly incident to the nature of any living creature that has no other passion but sensual, such as are hunger, thirst, lust, and anger. In sum, the discourse of the mind, when it is governed by design, is nothing but seeking or the faculty of invention . . . .

Sometimes a man desires to know the event of an action; and then he thinks of some like action past and the events thereof one after another, supposing like events will follow like actions (pp. 32-35).

John Locke ((1690) 1928) Excerpts from An essay concerning human understanding.

Chapter 12, Of complex ideas:

1. Made by the mind out of simple ones. -

We have hitherto considered those ideas, in the reception whereof the mind is only passive, which are those simple ones received from sensation and reflection before mentioned, whereof the mind cannot make one to itself, nor have any idea which does not wholly consist of them. But as the mind is wholly passive in the reception of all its simple ideas, so it exerts several acts of its own, whereby out of its simple ideas as the materials and foundations of the rest, the other is framed. The acts of the mind, wherein it exerts its power

over its simple ideas, are chiefly these three: 1. Combining several simple ideas into one compound one, and thus all complex ideas are made. 2. The second is bringing two ideas, whether simple or complex, together, and setting them by one another, so as to take a view of them at once, without uniting them into one; by which way it gets all its ideas of relations. 3. The third is separating them from all other ideas that accompany them in their real existence; this is called abstraction: and thus all its general ideas are made.

2. Made voluntarily. -

. . . .

In this faculty of repeating and joining together its ideas, the mind has great power in varying and multiplying the objects of its thoughts, infinitely beyond what sensation or reflection furnishes it with; but all this still confined to those simple ideas which it received from those two sources, and which are the ultimate materials of all its compositions: for simple ideas are all from things themselves, and of these the mind can have no more, nor other than what are suggested to it. It can have no other ideas of sensible qualities than what come from without by the senses; nor any ideas of other kind of operations of a thinking substance than what it finds in itself; but when it has once got these simple ideas, it is not confined barely to observation, and what offers itself from without: it can, by its own power, put together those ideas it has, and make new complex ones, which it never received so united (pp. 92-93).

Chapter 33, Of the association of ideas:

5. From a wrong connexion of ideas. - Some of our ideas have a natural correspondence and connexion one with another; it is the office and excellency of our reason to trace these, and hold them together in that union and correspondence which is founded in their peculiar beings. Besides this, there is another connexion of ideas wholly owing to chance or custom: ideas that in themselves are not at all of kin, come to be so united in some men's minds that it is very hard to separate them: they always keep in company, and the one no sooner at any time comes into the understanding, but its associate appears with it: and if they are more than two which are thus united, the whole gang, always inseparable, show themselves together.

6. This connexion how made. - This strong combination of ideas, not allied by nature, the mind makes in itself either voluntarily or by chance; and hence it comes in different men to be very different, according to their different inclinations, educations, interests, etc (pp. 217-218).

Chapter 23, Of our complex ideas of substances.

1. Ideas of substances, how made. -

> The mind being, as I have declared, furnished with a great number of the simple ideas, conveyed in by the senses, as they are found in exterior things, or by reflection on its own operations, takes notice also, that a certain number of these simple ideas go constantly together; which being presumed to belong to one thing, and words being suited to common apprehensions, and made use of for quick dispatch, are called, so united in one subject, by one name: which, by inadvertancy, we are apt afterward to talk of, and consider as one simple idea, which indeed is a complication of many ideas together; because, as I have said, not imagining how these simple ideas can subsist by themselves, we accustom ourselves to suppose some substratum wherein they do subsist, and from which they do result; which therefore we call substance (pp. 154-155).

David Hume ((1739),1961) Excerpt from A treatise of human nature.

Section IV, Of the connection or association of ideas:

> As all simple ideas may be separated by the imagination, and may be united again in what form it pleases, nothing would be more unaccountable than the operations of that faculty, were it not guided by some universal principles, which render it, in some measure, uniform with itself in all times and places. Were ideas entirely loose and unconnected, chance alone would join them; and it is impossible the same simple ideas should fall regularly into complex ones (as they commonly do), without some bond of union among them, some associating quality, by which one idea naturally introduces another. This uniting principle among ideas is not to be considered as an inseparable connection; for that has been already excluded from the imagination: nor yet are we to conclude, that without it the mind cannot join two ideas; for nothing is more free than that faculty: but we are only to regard it as a gentle force, which commonly prevails, and is the cause why, among other things, languages so nearly correspond to each other; Nature, in a manner pointing out to every one those simple ideas, which are most proper to be united into a complex one. The qualities, from which this association arises, and by which the mind is, after this manner, conveyed from one idea to another, are three, viz. resemblance, contiguity in time or place, and cause and effect.
>
> I believe it will not be very necessary to prove, that these qualities produce an association among ideas, and, upon the appearance of one idea, naturally introduce another. It is plain that, in the course of our thinking, and in the constant revolution of our ideas, our imagination runs easily from one idea to any other that resembles it, and that this quality alone is to the fancy a sufficient bond and association. It is likewise evident, that as the senses, in changing their objects, are necessitated to change them regularly, and take them as they lie contiguous to each other, the imagination

must, by long custom, acquire the same method of thinking, and run along the parts of space and time in conceiving its objects. As to the connection that is made by the relation of cause and effect, . . . it is sufficient to observe that there is no relation which produces a stronger connection in the fancy, and makes one idea more readily recall another, than the relation of cause and effect betwixt their objects (pp. 10-11).

Commentary on Hume's associationism (Conen, 1965).

In the Treatise and again in the Abstract, Hume claimed the principle of the association of ideas as one of his great inventions. Since he undertook to develop a 'science' of man, associationism served as a systematic way for uniting impressions and ideas. But association did not always work in the same way, and did not always work. Hume, by the time of the Enquiry, seemed to have reduced its significance, by minimizing the section devoted to it. But no alternative was offered, and it was still used to explain how ideas were connected (Editor's preface to the Essential works of David Hume, pp. 32-33).

David Hartley ((1749), 1966) Excerpts from Observations on man, his frame, his duty, his expectations.

Section II, Of ideas, their generation and associations; and of the agreement of the doctrine of vibrations with the phenomena of ideas.

Prop. 8. Sensations, by being often repeated, leave certain vestiges, types, or images, of themselves, which may be called, Simple Ideas of Sensation.

I took notice in the Introduction, that those Ideas which resemble Sensations were called Ideas of Sensation; and also they might be called Simple Ideas, in respect of the intellectual ones which are formed from them, and of whose very Essence it is to be complex. But the Ideas of Sensation are not intirely simple, since they must consist of Parts both coexistent and successive, as the generating Sensations themselves do.

Nov, that the simple Ideas of Sensation are thus generated, agreeably to the Proposition, appears, because the most vivid of these Ideas are those where the corresponding Sensations are most vigorously impressed, or most frequently renewed; whereas, if the Sensation be faint, or uncommon, the generated Idea is also faint in proportion, and, in extreme Cases, evanescent and imperceptible. The exact Observance of the Order of Place in visible Ideas, and of the Order of Time in audible ones, may likewise serve to shew, that these Ideas are Copies and Offsprings of the Impressions made on the Eye and Ear, in which the same Orders were observed respectively.

. . . .

Sensations remain for a short time after the Impression is removed; and these remaining Sensations grow feebler and feebler, till they vanish. They are therefore, in some Part of their Declension, of about the same Strength with Ideas, and, in their first State, are intermediate between Sensations and Ideas. And it seems reasonable to expect, that, if a single Sensation can leave a perceptible Effect, Trace, or Vestige, for a short time, a sufficient Repetition of a Sensation may leave a perceptible Effect of the same kind, but of a more permanent Nature, i.e. an Idea, which shall recur occasionally, at long Distances of Time, from the Impression of the corresponding Sensation, & Vice versa (pp. 56-59).

Prop. 10. Any Sensations A, B, C, etc. by being associated with one another a sufficient Number of Times, get such a Power over the corresponding Ideas a, b, c, etc. that any one of the Sensations A, when impressed alone, shall be able to excite in the Mind b, c, etc. the Ideas of the rest.

Sensations may be said to be associated together, when their Impressions are either made precisely at the same Instant of Time, or in the contiguous successive Instants. We may therefore distinguish Association into Two Sorts, the synchronous, and the successive.

The influence of Association over our Ideas, Opinions and Affections, is so great and obvious, as scarce to have escaped the Notice of any Writer who has treated of these, thougn the Word Association, in the particular Sense here affixed to it, was first brougnt into Use by Mr. Locke. But all tnat has been delivered by the Antients and Moderns, concerning the Power of Habit, Custom, Example, Education, Authority, Party-prejudice, the Manner of learning the manual and liberal Arts, etc. goes upon this Doctrine as its Foundation, and may be considered as the Detail of it, in various Circumstances.

. . . .

Prop. 11. Any Vibrations, A, B, C, etc. by being associated together a sufficient Number of Times, get such a Power over a, b, c, etc. the corresponding miniature Vibrations, tnat any of the Vibrations A, when impressed alone, shall be able to excite b, c, etc. the Miniatures of the rest.

. . . .

Let A and B be two Vibrations, associated synchronically, Now, it is evident, that the Vibration A (for I will, in this Proposition, speak of A and B in the singular Number, for the sake of greater Clearness) will, by endeavouring to diffuse itself into those Parts of the medullary Substance which are affected primarily by the Vibration B, in some measure modify and change B, so as to make B a little different from what it would be, if impressed alone. For the same Reasons the Vibration A will be a little affected, even in its

primary Seat, by the Endeavour of B to diffuse itself all over the medullary Substance. Suppose now the Vibrations A and B to be impressed at the same Instant, for a thousand Times; it follows, from the Ninth Proposition, that they will first overcome the Disposition to the natural Vibrations N, and then leave a Tendency to themselves, which will now occupy the Place of the original natural Tendency to Vibrations. When therefore the Vibration A is impressed alone, it cannot be intirely such as the Object would excite of itself, but must lean, even in its primary Seat, to the Modifications and Changes induced by B, during their thousand joint Impressions; and therefore much more, in receding from this primary Seat, will it lean that Way; and when it comes to the Seat of B, it will excite B's Miniature a little modified and changed by itself (pp. 65-67).

Alexander Bain (1894) Excerpts from The senses and the intellect.

Chapter III, Compound Association:

Obstructive Associations. Both in the present chapter, and in speaking of constructive associations in the following chapter, it is open to us to remark the distracting influence of too many ideas. Promptitude of action is greatly favoured by the fewness of the considerations that enter into a question. Marvels of ingenuity are often accomplished through the absence of superfluous suggestions. In the operations of animals, of keeping with the range of their faculties; in some instances, the explanation is found in the limitation of their views. The animal does not suffer from a crowd of incompatible associations. The same circumstance often explains the extraordinary facility of speech, or the readiness in action, of men very deficient in mental force generally. It is observed by philologists that our cultivated languages have ceased to form new roots. The reason is, that the existing roots stand in the way. Originality is everywhere arrested by the presence of a large stock of already-formed conceptions. Children, before learning the common-places, often give birth to original remarks ((pp. 597-598).

. . . .

Introduction, Mechanical constructiveness, Verbal constructiveness.

Under the head of Similarity, we have had to trace the workings of a power tending to originality and invention, as when - in virtue of the identifying of two things lying far apart in nature - whatever is known of the one is instantly transferred to the other, thereby constituting a new and instructive combination of ideas. Such was the case when Franklin's identification of electricity and thunder led to the application of the Leyden jar to explain a thunderstorm. The power of recalling like by like, in spite of remoteness,

disguise, and false lures, enters, as we have seen, into a very large number of inventive efforts, both in the sciences and in the arts. But we have now to deal with constructions of a higher order of complexity. There are discoveries that seem nothing short of absolute creations - as for example, the whole science of Mathematics; while, in the Fine Arts, a frieze of the Parthenon, a Gothic cathedral, a Paradise Lost, are very far beyond the highest stretches of the identifying faculty taken by itself.

Nevertheless, the intellectual forces operating in those creations are no other than the associating forces already discussed. The new combinations grow out of elements already possessed by the mind, and brought to view according to the laws already laid down.

. . . .

It would thus appear that the first condition of verbal combinations for the expression of meaning, is a sufficient abundance of already formed combinations to choose from; in other words, the effect depends on the previous acquisitions, and on the associating forces whereby old forms are revived for the new occasion. If a complex meaning has to be expressed, every part of this meaning will revive, by contiguity and similarity, some former idea of an identical or like nature, and the language therewith associated; and, out of the mixed assemblage of foregone phrases, the volition must combine a whole into the requisite unity, by trial and error. The more abundant and choice the material supplied from the past by the forces of intellectual recovery, the better will be the combination that it is possible for the mind to form by the selecting effort (pp. 605-610).

Fine Art Constructions - Imagination.

. . . .

With reference to examples of constructiveness of the class now cited, I may repeat the remark already made, to the effect that no new principle of association is at work in making an original combination; the only thing requisite being the presence or concurrence of the proper ingredients, as furnished by the working of Contiguity and Similarity. When these ingredients appear in the mind together, they fall into their places as a matter of course. In the present instance, and in all imaginative or emotion-ruled combinations, the laws of association can be shown to be sufficient to furnish the constituents of the combination; for, we know that each strong feeling or passion has, associated with it in the mind, a large number of kindred objects, in consequence of the previous frequent companionship of such objects with the feeling. The passion of terror is connected with the things that have roused the feeling in the course of each one's experience: one man has associations between it and a cruel

parent or master, another with money losses, a third with attacks of illness, a fourth with defamation, a fifth with religious workings; and most men are familiar with a plurality of causes of dread. When, therefore, the feeling is once excited, no matter how, these often-experienced adjuncts start up and possess the mind, and mix themselves with the other ideas of the situation, so as to constitute a medley or compound of images, with terror as the predominating tone (p. 639).

Abraham Tucker (1768) Citations from and commentary on The light of nature pursued, 2nd edition (from Warren, 1921).

Tucker reverts to Locke's position in attributing ideas to reflection as well as sensation.

. . . .

Tucker gives the generic name of combination to this juncture of ideas, which he says, includes two separate modes, association and composition. Thus Tucker was the first to recognize explicitly the difference between a union without alteration of the components, and the sort of connection wherein the ideas so 'melt together as to form one single complex idea'. The latter process, composition, or in modern terms fusion, was afterwards developed into the theory of mental synthesis or mental chemistry. Tucker's statement of this principle is perhaps his most important contribution to the association theory: 'A compound may have properties resulting from the composition which do not belong to the parts singly whereof it consists'.

Tucker considers simultaneous combination an earlier manifestation than successive combination. The rise of the latter he attributes to the fact that clusters of simultaneous ideas are generally too large to be taken in by the mind together; thus only a part of the clusters appears at first, but on account of their connection other parts or groups are immediately afterwards called up. There is an 'attraction' between ideas, so that the preceding idea generally determines what associate shall appear; and the association, once formed, cements the ideas together. Ideas bearing reference to some purpose in view tend in this way to appear in regular succession; and such a succession he terms a train. 'Our trains once well formed, whatever suggests the first link, the rest follow readily of their own accord'. As assemblages of ideas form trains, so trains become connected into 'courses of thinking'. He notes, moreover, that often some of the middle terms of a train fall out as the result of frequent repetition - the doctrine of lapsed links.

Reasoning, according to Tucker, is not a separate faculty,

but is the 'discerning of the agreement of two ideas between themselves by their agreement with some third'. The mental processes usually attributed to the separate faculties of apprehension, judgment, and ratiocination, be believes, may be completely described in terms of perception, and there are in reality only two modes of perception - imagination and understanding, both of which are 'acquired by use and practice,. . . the latter growing out of the former' (pp. 65-67).